

TWENTY-SECOND ANNUAL REPORT
OF THE
SECRETARY
OF THE
STATE BOARD OF AGRICULTURE
OF THE
STATE OF MICHIGAN,

FROM

October 1st, 1882, to September 30, 1883.



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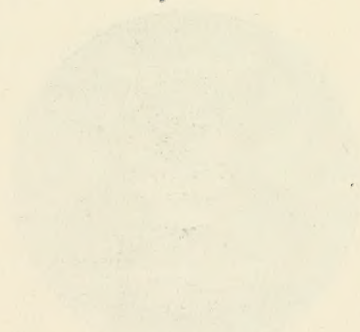
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STATE BOARD OF AGRICULTURE

STATE OF MICHIGAN

OFFICE OF THE STATE BOARD OF AGRICULTURE



OFFICE OF THE STATE BOARD OF AGRICULTURE

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State Board of Agriculture.

HON. FRANKLIN WELLS, of Constantine.

PRESIDENT OF THE BOARD.

HON. THOMAS D. DEWEY, of Owosso,

VICE PRESIDENT.

HON. HENRY G. REYNOLDS, of Old Mission.

HON. WM. B. MCCREERY, of Flint,

HON. ELIJAH W. RISING, of Davison Station,

HON. HENRY CHAMBERLAIN, of Three Oaks.

JOSIAH W. BEGOLE, GOVERNOR OF THE STATE,

THEOPHILUS C. ABBOT, PRESIDENT OF THE COLLEGE.

} *Ex-Officio.*

ROBERT G. BAIRD, SECRETARY.

EPHRAIM LONGYEAR, TREASURER.

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REPORT OF THE SECRETARY
OF THE
STATE BOARD OF AGRICULTURE.

AGRICULTURAL COLLEGE, }
Lansing, October 1st, 1883. }

TO JOSIAH W. BEGOLE,

Governor of the State of Michigan;

I have the honor to submit herewith to your excellency, as required by statute, the accompanying annual report for the year ending Sept. 30th, 1883, with supplementary papers.

Respectfully yours,

R. G. BAIRD,

Secretary State Board of Agriculture.

COLLEGE ACCOUNTS

(FOR THE YEAR ENDING SEPTEMBER 30, 1883.)

SECRETARY'S ACCOUNT.

Dr.

To balance on hand Oct. 1, 1882..... \$414 91

RECEIVED ON ACCOUNT OF SPECIAL APPROPRIATIONS.

State Treasurer:

Mechanical department.....	\$150 00	
Repairs of buildings.....	3,000 00	
Water-works.....	4,267 00	\$7,417 00

Sale of microscopes:

Horticultural and Botanical departments.....	17 25	
Botanical department.....	15 00	32 25

On account of current expenses, State Treasurer:

Interest.....	22,139 13	
Trespass receipt.....	4,000 00	
Appropriations.....	4,192 50	30,331 63

Receipts of Institution:

Farm department.....	3,838 62	
Horticultural department.....	1,009 85	
Mechanical department.....	328 46	
Land sold.....	391 95	
Boarding hall (exclusive of students).....	343 93	
Zoölogical department, C. E.....	24 00	
General account.....	1,832 46	
Apiary.....	25 97	7,795 24

Students on account of :

Board, (fall term).....	1,939 54	
Incidentals and room rent.....	2,521 10	
Chemicals.....	676 02	
Matriculation fees.....	373 00	
Graduating fees (diplomas).....	135 00	
Special examinations.....	85 50	5,730 16

Cr.

By cash paid E. Longyear.....		51,614 89
By balance October 1, 1883.....		106 30
	\$51,721 19	\$51,721 19

SUMMARY OF TREASURER'S REPORT.

E. Longyear in account with Agricultural College.

Dr.

To balance October 1, 1882.....	\$7,211 32
To amounts received from State Treasurer and Secretary of State Board of Agriculture.....	51,614 89

Cr.

By warrants paid from Oct. 1st, 1882, to Sept. 30, 1883.....		\$56,801 94
By balance to new account Oct. 1st, 1883.....		2,024 27
	<u>\$58,826 21</u>	<u>\$58,826 21</u>

The above is a correct summary of my report to State Board of Agriculture.

E. LONGYEAR, *Treasurer.*

SUMMARY OF WARRANT ACCOUNT.

Disbursements on account of special appropriations:

Farm department.....	\$219 59	
Horticultural department.....	376 14	
Buildings and repairs.....	2,883 16	
Library.....	760 16	
Chemical department.....	1,161 83	
Botany and Horticulture.....	454 82	
Institutes.....	218 75	
Experiments with ensilage.....	202 08	
Zoological department.....	993 63	
Mechanical department.....	8 00	
Mathematical and engineering department.....	240 00	
Water-works.....	2,602 80	
Botanical department.....	234 16	
Boiler house.....	346 50	\$10,701 62

Disbursements on account of current expenses:

Salaries.....	22,373 19	
Secretary's office.....	342 97	
President's office.....	48 59	
Repairs.....	553 19	
Steam.....	430 87	
Fuel.....	2,910 33	
Incidentals.....	1,605 94	
Library.....	6 99	
Sunday services.....	140 00	
Carpenter shop.....	973 80	
Advances refunded.....	18 38	
Printing.....	191 55	
Student's labor.....	1,053 19	
Botanical class-room.....	94 50	
Chemical laboratory.....	569 82	
Apiary.....	27 70	
Ice.....	38 30	
Board of employés.....	190 32	
Advertising.....	25 20	
Brickyard.....	1,898 48	
Farm department.....	4,413 04	
Horticultural department.....	3,932 74	
Boarding hall.....	4,261 43	46,100 32

\$56,801 94

COLLEGE ACCOUNTS.

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DEPARTMENT ACCOUNTS.

FARM DEPARTMENT.

In account with Agricultural College.

Dr.

To cash disbursements on account of:

Labor, (men, teams, etc.).....	\$1,065 55	
Farm house.....	604 76	
Farm office.....	33 95	
Implements.....	440 52	
Students' labor.....	1,329 37	
Cattle.....	559 11	
Sheep.....	25 64	
Swine.....	81 90	
Team.....	85 76	
Drains.....	29 95	
Repairs.....	136 30	
Seeds.....	20 23	\$4,413 04

Cr.

By cash receipts on account of:

Implements.....	80 35	
Swine.....	487 40	
Cattle.....	1,931 58	
Grain.....	354 07	
Men and team labor.....	3 25	
Students' labor.....	29 16	
Grain.....	521 03	
Sheep.....	210 04	
Team.....	80 51	
Repairs.....	1 25	
Lumber.....	3 10	
Drains.....	4 92	
Wood.....	117 09	
Hay.....	14 87	3,838 62

HORTICULTURAL DEPARTMENT.

In account with Agricultural College.

Dr.

To cash disbursements on account of:

Team.....	\$1,118 32	
Greenhouse.....	316 00	
Students' labor.....	1,596 16	
Labor, (men, teams, etc.).....	224 51	
Office.....	28 87	
Grounds.....	206 07	
Vegetable garden.....	69 30	
Miscellaneous.....	26 39	
Tools.....	157 32	
Experiments.....	1 70	
Board of employees.....	188 10	\$3,932 74

Cr.

By cash receipts on account of:

Greenhouse.....	\$203 89	
Vegetable garden.....	382 22	
Grounds.....	47 87	
Team.....	291 96	
Ice.....	75 44	
Labor (men and teams).....	2 60	
Students' labor.....	3 92	
Sundries.....	1 95	1,009 85

SUMMARY OF INVENTORY, SEPTEMBER 30TH, 1883.

College Hall.....	\$15,000 00	
Williams Hall.....	45,000 00	
Wells Hall.....	25,000 00	
Library and Museum Building.....	25,000 00	
Chemical Laboratory.....	18,000 00	
Botanical Laboratory.....	6,000 00	
Farm House.....	3,500 00	
Three brick houses @ \$3,000.....	9,000 00	
Two brick houses @ \$3,500.....	7,000 00	
President's and two frame houses.....	20,728 00	
Herdsmen's house.....	600 00	
Seven barns at professors' houses @ \$300.....	2,100 00	
Horticultural barn and shed.....	1,100 00	
Cattle barn and shed.....	3,400 00	
Sheep barn.....	2,500 00	
Horse barn.....	3,000 00	
Piggery.....	2,000 00	
Brick work-shop.....	600 00	
Corn-house.....	500 00	
Blacksmith shop and tool shed.....	300 00	
Greenhouse.....	9,500 00	
Grain barn.....	1,600 00	
Tool house.....	1,300 00	
Observatory.....	150 00	
Boiler house and fixtures.....	3,870 00	
Underground piping for steam.....	2,000 00	
Ice house.....	250 00	
Bee house.....	280 00	
Twelve fire extinguishers.....	500 00	
College farm and park—676 acres @ \$70.....	47,320 00	
Water-works.....	4,150 00	
Brickyard, stock, tools, etc.....	2,288 00	
Fuel on hand.....	683 00	
		\$264,219 00
Farm department:		
Cattle.....	\$14,790 00	
Sheep.....	1,686 00	
Swine.....	698 00	
Horses.....	650 00	
Implements, produce, etc.....	7,257 35	25,081 35
Horticultural department:		
Teams, harness, etc.....	615 00	
Nursery stock.....	318 20	
Tanks and pumps.....	50 00	
Tools and miscellaneous.....	912 18	
Plants, fuel, etc., at greenhouse.....	4,322 00	6,217 38
Library:		
Books, pamphlets, and furniture.....		16,575 45
General museum:		
Cases, collections, etc.....		9,980 95
Chemical department:		
Apparatus, chemicals, etc.....		9,553 75
Department of engineering and mathematics:		
Telescope and class-room apparatus.....	\$2,804 20	
Steam fitting, tools and stock.....	816 54	3,620 74
College hall:		
Furniture.....		750 00
Mechanical department:		
Tools and lumber.....		350 00
President's office:		
Furniture, stationery, etc.....		305 53
Secretary's office:		
Furniture, stationery, etc.....		419 70

SUMMARY OF INVENTORY.--CONTINUED.

Apiary:	
Bees, stock, and apparatus.....	\$366 80
Botanical museum and class-room:	
Specimens, furniture, microscopes, etc.....	6,519 25
Total	<u>\$343,959 90</u>

SUPPLEMENTARY STATEMENT OF THE SECRETARY.

SALARIES.

The salaries of the officers and employes of the College are as follows:

President, \$3,000; eight professors, \$1,800 each; secretary, \$1,500; assistant secretary, \$600; one professor, \$1,000; assistant in chemistry, \$800; one instructor, \$600; librarian, \$600; farm foreman, \$600 and board; florist, \$743; foreman of the horticultural department, \$750; engineer \$600.

BUILDINGS.

The two buildings for which appropriations were made by the Legislature of 1883 have not been erected. The contract has been let for the boiler house and chimney, and work commenced. As soon as a plan for the professors' residence has been accepted by the Board, arrangements will be made for letting the contract. It is expected that both of these buildings will be completed during the summer of 1884.

COLLEGE LANDS.

Through the courtesy of the Commissioner of the State Land Office we are enabled to publish the following tables, showing by counties the sales of Agricultural College lands for the year ending September 30th, 1883. Also showing by counties the number of acres of Agricultural College lands subject to entry November 1st, 1883:

AGRICULTURAL COLLEGE LAND.

TABLE NO. 1.—Showing by Counties the Amount of Agricultural College Land Sold at Original Sale during the Year ending September 30, 1883.

COUNTIES.	Acres.	Price.	Amount.	Amount Paid.	Amount Due.
Alcona.....	975.19	\$5 00	\$4,875 95	\$4,875 95	-----
Alpena.....	80.00	5 00	400 00	100 00	\$300 00
Antrim.....	920.00	5 00	4,600 00	2,650 00	1,950 00
Benzie.....	320.00	5 00	1,600 00	400 00	1,200 00
Cheboygan.....	200.00	5 00	1,000 00	850 00	150 00
Kalkaska.....	160.00	5 00	800 00	200 00	600 00
Manistee.....	1,000.00	5 00	5,000 00	2,050 00	2,950 00
Missaukee.....	640.00	5 00	3,200 00	2,450 00	750 00
Montmorency.....	79.90	5 00	399 50	100 00	299 50
Oscoda.....	820.48	5 00	4,102 40	3,452 00	650 00
Otsego.....	40.00	5 00	200 00	200 00	-----
Presque Isle.....	160.00	5 00	800 00	200 00	600 00
Wexford.....	1,640.00	5 00	8,200 00	4,925 00	3,275 00
Total.....	7,035.57	-----	\$35,177 85	\$22,453 35	\$12,724 50

AGRICULTURAL COLLEGE LAND.

TABLE No. 2.—Showing by Counties the Amount of Forfeited Agricultural College Land Sold during the Year ending September 30, 1883.

COUNTIES.	Acres.	Price.	Amount.	Amount Paid.	Amount Due.
Alcona.....	80.00	\$5 00	\$400 00	\$400 00	-----
Cheboygan.....	40.00	5 00	200 00	50 00	\$150 00
Grand Traverse.....	120.00	5 00	600 00	300 00	300 00
Manistee.....	480.00	5 00	2,400 00	1,650 00	750 00
do.....	40.00	5 20	208 00	208 00	-----
do.....	40.00	6 00	240 00	240 00	-----
Missaukee.....	120.00	5 00	600 00	259 00	350 00
Montmorency.....	80.00	5 00	400 00	100 00	300 00
Oscoda.....	40.00	5 00	200 00	200 00	-----
Presque Isle.....	40.00	5 00	200 00	50 00	150 00
Wexford.....	600.00	5 00	3,000 00	1,099 52	1,900 48
Total.....	1,680.00	-----	\$8,448 00	\$4,547 52	\$3,900 48

Table showing by counties the number of acres of Agricultural College lands subject to entry November 1st, 1883.

Name of County.	No. of Acres.
Alcona.....	22,240.67
Alpena.....	840.00
Antrim.....	3,320.93
Benzie.....	4,400.00
Charlevoix.....	3,524.98
Cheboygan.....	5,408.76
Grand Traverse.....	520.00
Iosco.....	26,874.97
Kalkaska.....	1,080.68
Manistee.....	6,280.00
Missaukee.....	799.64
Montmorency.....	7,985.90
Oscoda.....	15,284.07
Otsego.....	3,833.59
Presque Isle.....	400.00
Wexford.....	23,480.00
Total.....	126,274.19

BOUNTY ON SORGHUM SUGAR.

Mr. Daniel Root, of Hudson, Mich., sent me the following statement regarding the manufacture of sugar from sorghum cane:

In the year 1882, about the middle of May, I planted twenty acres of land to early amber cane, in check rows three and a half feet apart. I cultivated it the same as for corn, without any extra fertilizer. On the twentieth of September I commenced to harvest and work up the crop. I used a good

three-roll, steam-power mill, and ran the juice into defecating tanks, putting in milk of lime to neutralize the acid in the juice. The juice was then heated to 210° F., causing a thick scum to form on the surface and considerable sediment to settle at the bottom. I removed the scum and ran the clear juice into the evaporator by means of a swing pipe, then put in water charged with a sufficient quantity of sulphur fumes or sulphurous acid to turn blue litmus paper red. The contents were then boiled until it reached 228° F. and run into the cooler. The syrup weighed 11½ pounds to the gallon. The twenty acres planted to cane yielded 4,000 gallons, or 200 gallons per acre. I boiled part of the syrup until it tested 234° F. That went to sugar in a short time, varying from a few hours to three or four days. Not having any convenience to separate the sugar, it was not done till the summer of 1883, when it yielded 4¾ pounds of sugar to the gallon of melada. I made 2,100 pounds of sugar like the sample I sent you. It was made by the ordinary centrifugal process.

DANIEL ROOT.

The affidavit accompanying this statement, as also that of Dr. R. C. Kedzie as to the amount of crystallizable sucrose sugar contained in the specimen furnished for examination, is on file in my office.

I laid Mr. Root's report before the State Board of Agriculture, also the affidavit above referred to. The Board regarded Mr. Root as having complied with the requirements of Act No. 268, statutes of 1881, entitled "An Act to encourage the culture of sugar cane and the sugar beet, and the manufacture of sugar from the same," passed a resolution declaring him entitled to the bounty provided for in said Act. The amount was received by him soon afterwards.

This is the only case in which bounty has as yet been applied for under the statute above referred to.

DEPARTMENT REPORTS.

PRESIDENT'S REPORT.

To the State Board of Agriculture:

I respectfully submit the following report of the State Agricultural College, for the college year, 1883; together with the reports of the heads of the various departments. So far as students and classes are concerned, the report closes with the close of the college year, August 31, 1883.

REPORT TO BE ANNUAL.

In my last report I represented that the State, by its agreement with congress, was under obligation to print an annual report of the college; and Governor Jerome in his retiring message called attention to the duty. The following law, providing for annual reports, was accordingly passed:

AN ACT to provide for the publication and distribution of the reports of the secretary of the State Board of Agriculture, and the reports of the State Horticultural Society, and to repeal all existing laws providing for the publication and distribution of said reports.

SECTION 1. *The People of the State of Michigan enact*, That the secretary of the State board of agriculture shall report to the Legislature at every regular session thereof, and to the Governor on the first Wednesday of January of each year when the Legislature is not in session; which report shall embrace all statements, accounts, prize-essays, statistics, and other information relative to agriculture in general, proceedings of the State board of agriculture, of the State agricultural college and farm, of the State agricultural society, and of the county and district agricultural societies, to be approved by the board; that eight thousand copies of this report shall be printed and bound annually, prior to the first day of June, and shall be immediately placed at the disposal of the State board of agriculture; four thousand copies to be distributed by the secretary of said State board of agriculture as the board shall direct; and the remaining four thousand copies to be distributed prior to the first day of September after publication by the secretary of the board, to the secretary of the State agricultural society, to the secretary of the State grange, and to the secretaries of the various district and county societies, as equally as may be, according to the population of said counties, to be, by said secretaries, distributed among the various reviewing committees of county and district fairs, giving one volume of said report to each of said committees as shall be present and discharge the duties of the office on the day of the county and district fairs; and in addition to the foregoing, there shall be published a number of copies of said report equal to the number of reports bound as joint documents, which shall be disposed of in the same manner as the joint documents, also a sufficient number of copies to supply crop correspondents with one copy each, which shall be distributed by the secretary of state.

SEC. 2. Has reference to the State horticultural society.

SEC. 3. Repeals all other acts or parts of acts inconsistent with the provisions of this act.

Approved June 6, 1883.

GOVERNOR'S MESSAGE.

His Excellency, Governor Begole, in his message to the Legislature, June 3, 1883, gave but few sentences to the Agricultural College, but they were pointed and commendatory. He said: "The Agricultural College is so near the capitol that you will, no doubt, visit it, and learn its needs. I can most heartily endorse the present management."

Governor Jerome, in his retiring message, spoke more fully of the college as follows: "This college was established in 1855. The means for its construction and maintenance have been derived from the following sources:

"Appropriation by the Legislature of 22 sections of salt spring lands, for which the money was advanced by the State amounting to.....	\$56,320.00
"In 1861 a further appropriation by the Legislature of swamp lands, which have been sold for.....	42,396.87
"Total realized for State lands sold.....	\$98,717.87
"In 1862 the United States government donated to this, with other State, lands to be used in establishing Agricultural Colleges. 240,000 acres were nominally set apart to this State, but owing to the loss from fractional sections the amount received was really but 235,973.37 acres. 100,203.50 acres of these lands have been sold, and \$224,868.15 received thereon. This has been used by the State, and on which interest has been, and will continue to be paid at 7%. The total interest paid, beginning in 1870, up to Sept. 30, '82, on the above, amounts to.....	179,626.82
	<hr/> \$278,343.69
"Appropriations in cash have been made from 1857 to 1882, both years included, amounting to.....	558,744.84
"Making a total expenditure of	<hr/> <hr/> \$837,088.53
"This amount divided by 26, the number of years since the College was established, makes an average annual expenditure of.....	\$32,195.71
"The property of the College on Dec. 1st, 1882, exclusive of granted lands for sale, is estimated at.....	338,471.55
"Deduct from the total expenditures it leaves.....	498,616.98
"Which if divided by 26, shows the average annual cost of maintaining the College, after allowing for the value of the land and the permanent improvements.....	<hr/> \$19,177.57
"There remains unsold of the lands granted by the government, 135,469.87 acres, which, when sold, will increase the endowment doubtless to \$900,000.	
"Appropriations are asked for the year 1883.....	\$37,411.00
" " " " 1884.....	22,411.00
	\$59,822.00
"In excess of the estimated receipts for interest, farm, horticultural department, and from students, amounting to \$29,000 annually	58,000.00
"Total estimated ^d expenditures for the two years.....	<hr/> 117,822.00

"The appropriation for 1881 was-----	\$50,969.50
" " " 1882 was-----	16,194.50
	<hr/>
	\$67,164.00

"The purposes for which the funds are asked for the coming two years are fully set forth in the report of the managers herewith submitted, to which your attention is called, especially to that feature which relates to the establishment of a mechanical department. This department is urged by the State Board of Agriculture, and some of the agricultural societies.

"The report of the President calls attention to the requirements of the Act of Congress making the grant of land for this College, as to annual reports, whereas the Legislature provides for publishing biennial reports only. The conditions of the grant should be complied with, and Act No. 206 of 1881 should be modified in this respect.

"The buildings for which appropriations were made in 1881 have all been completed, and are now occupied. A new system of steam heating has also been provided with success as to heating, and it reduces the fire risk of the old plan materially. The secretary reports the liabilities of the College fully discharged, and sufficient funds on hand to defray the expenses of the remainder of the calendar year.

"Success has attended the undertaking to educate young men to become farmers. The total number of graduates up to the close of the last year was 272. I quote from a statement of President Abbot the following: 'Of this number more than one-half are engaged in farming, horticulture, or in agricultural schools as their business. A careful examination shows that less than two per cent. of the graduates of other kinds of colleges take up agriculture as a pursuit.' I respectfully refer you to the above report for more particular statements."

LEGISLATION.

The legislation in 1883 regarding the college, had reference to the making and printing of reports as already given; to the deposit of military arms and accoutrements at the college; and to the support of the college for the years 1883 and 1884.

Estimates for the support of the college were presented to the Legislature by the State Board of Agriculture in the printed report for 1881-2. See pages 13 to 18.

The standing committees on the college in Senate and House, acting as a joint committee, cut out the estimates \$18,600.00 for the establishment of a Mechanical Department, and the item for insurance, and added an item of \$5,000.00 for the erection of a boiler house and chimney, \$4,267.00 for steam pump, pipes, hose, etc., for a system of water-works, and \$1,000.00 for the purchase of mechanical tools.

The bill as made out by this joint committee was approved by the committee on finance, and of ways and means, and became a law, receiving one adverse vote in the Senate, and four in the House.

AN ACT making an appropriation for the support of the State Agricultural College, for the erection and repair of buildings, and other improvements at the said College.

SECTION 1. *The People of the State of Michigan enact*, That there shall be and is hereby appropriated out of the State Treasury the sum of eight thousand three hundred and eighty-five dollars, for the year one thousand eight hundred and eighty-

three, and the sum of eight thousand three hundred and eighty-five dollars for the year one thousand eight hundred and eighty four, for the use and support of the State Agricultural College.

SEC. 2. There shall be and is hereby appropriated out of the Treasury the sum of three thousand dollars, for a house for the professor of horticulture, five thousand dollars for the erection of a boiler house and chimney, four thousand two hundred and sixty-seven dollars for steam pump, pipes, hose, etc., for a system of water-works, and one thousand dollars for the purchase of mechanical tools.

SEC. 3. There shall be and is hereby appropriated out of the State Treasury the sum of six hundred dollars for farmers' institutes, three thousand one hundred and twenty-five dollars for the library, seven hundred dollars for the department of mathematics and engineering, one thousand dollars for the chemical department, one thousand nine hundred and forty-five dollars for the zoölogical department, one thousand three hundred and forty-two dollars for the horticultural department, three thousand three hundred and eighty-nine dollars for the farm department, two thousand two hundred and thirty-one dollars for the botanical department, six thousand seven hundred and twenty dollars for repairs of buildings. Said amounts embraced in this section aggregating twenty-one thousand and fifty-two dollars to be paid, one-half of the same in the year one thousand eight hundred and eighty-three, and one-half in the year one thousand eight hundred and eighty-four, which said moneys, provided for in this act, or so much thereof as may be necessary, shall be expended under the direction of the State Board of Agriculture for the purposes aforesaid, and shall be drawn from the treasury on the presentation of the proper certificates of said Board to the Auditor General, and on his warrant to the State Treasurer.

SEC. 4. There shall be assessed upon the taxable property of the State in the year one thousand eight hundred and eighty-three the sum of thirty-two thousand one hundred and seventy-eight dollars, and in the year one thousand eight hundred and eighty-four the sum of eighteen thousand and nine hundred and eleven dollars to be assessed and levied in like manner as other taxes are by law assessed, levied, and paid, which tax, when collected, shall be credited up to the general fund to reimburse to the same the sum to be drawn therefrom as provided in this act, and any sums drawn under the provisions of this act before the taxes herein authorized are collected shall be returned when such taxes are collected, which said moneys provided for in this act, or so much thereof as may be necessary, shall be expended under the direction of the State Board of Agriculture for the purposes aforesaid, and shall be drawn from the treasury on the presentation of the proper certificates of said Board to the Auditor General, and on his warrant to the State Treasurer.

This act is ordered to take immediate effect.

Approved May 18, 1883.

THE BOARD OF AGRICULTURE.

With the appointments upon the Board of Governor Begole, the terms of office of the Hon. H. G. Wells of Kalamazoo, and of the Hon. Geo. W. Phillips of Romeo, expired. Up to the time of the new appointments the Hon. H. G. Wells had been identified with the college from the time of its reorganization in 1861. He was named in the law, as one of the first members of the Board. On the drawing of lots for terms of office Mr. Wells drew for four years, and he has been three times reappointed by as many different Governors for additional terms of six years each. From the spring of 1869 up to within a few months, Judge Wells has been the president of the Board; and previous to that time he acted as vice president, it being customary to elect the Governor of the State to be president, until it was seen that his many official duties did not leave the Governor time to attend to the details of college business.

When Judge Wells was appointed by Gen. Grant, President of the United States, to be presiding Judge of the Alabama claims court, he sent to the president of the college a resignation of his place upon the Board, but at the earnest request of every one of his colleagues he retained his membership, and his resignation was never formally presented. Similar representations were

made to him of the unanimous desire that he should not resign when he was again appointed by President Arthur to be the presiding judge of the new Alabama claims court.

Judge Wells, as President of the Board, gave the college a large share of his interest and time. All documents of importance, all sales of lands of large amounts were committed to his care. In certain crises of the college, Mr. Wells has given weeks together of his time to its interest, and has enlisted many friends in its behalf. He carries with him off the Board the sincere affection and esteem of his successive associates on the Board for the last twenty years. The college library is fortunate enough to possess a fine oil painting of Mr. Wells, a gift of his to the college.

Mr. Geo. W. Phillips had been a member of the executive committee of the State Agricultural Society long before he became, by appointment of Governor Baldwin, a member of the Board. It was fortunate for the college that it had so warm and outspoken a friend in that body. Mr. Phillips's acquaintance with farming in general, and stock in particular, and his general acquaintance with business made him a valuable counselor and member of the Board.

The newly appointed members of the Board are the Hon. Henry Chamberlain of Three Oaks, well known and respected throughout the State, and Hon. Elijah W. Rising of Davison Station, well known also as a gentleman, and a member for many years of the executive committee of the State Agricultural Society.

The Board was reorganized at the first meeting after the new appointments, by the election, unanimously, of Hon. Franklin Wells of Constantine, for President, of Hon. Thomas D. Dewey for Vice President, and the reelection, unanimously, of Robert G. Baird as Secretary, and Ephraim Longyear as Treasurer.

The following committees were constituted :

On Buildings and Repairs—Thos. D. Dewey, of Owosso, Franklin Wells of Constantine.

On Employés—H. G. Reynolds of Old Mission, Wm. B. McCreery of Flint.

On the Farm—Henry Chamberlain of Three Oaks, E. W. Rising of Davison Station, and Franklin Wells.

On Finance—Wm. B. McCreery, E. W. Rising.

On Horticulture and Botany—H. G. Reynolds, T. D. Dewey.

On Institutes—E. W. Rising, Henry Chamberlain.

OFFICERS OF THE COLLEGE.

At or near the beginning of the present year, 1883, certain changes were made in the officers of the institution.

Forestry was added to Dr. Beal's professorship. Mr. Louis Knapper was transferred from the Superintendency of the Horticultural Department to the position of Florist, made vacant by the resignation (Jan. 15) of the former occupant, Mr. James Cassidy. Mr. Eugene D. Willis, a graduate of 1882, was made foreman of the vegetable garden.

The most important changes were the entering on duty of two newly appointed professors. Mr. Jas. Satterlee, Professor of Horticulture and Superintendent of the Horticultural Department, was graduated from the college in 1869. He received the degree of Master of Science in 1874. The State Horticultural Society was consulted regarding the selection of a person

for this professorship, and expressed great satisfaction with the selection of Mr. Satterlee for the position.

Mr. Satterlee entered upon duty January 1st, 1883, and in addition to the charge of the department out of doors, gives lectures on Horticulture and Landscape Gardening.

Prof. E. A. A. Granger, V. S., was for seven years the professor of veterinary in the Ontario Agricultural College at Guelph, Ontario, and presidents, professors, government officers, and others speak of him in the highest terms, and manifest sincere regret at losing him.

The course of instruction in Veterinary has been enlarged to a full year for those who elect it. Mr. Grange came as a lecturer, but is now under regular appointment as a professor in the college.

In November, 1883, Henry W. Baird, a graduate of the college, class of '83, was appointed by the Board Assistant Secretary of the college, with a salary at the rate of \$600 a year. By this appointment the Secretary of the college will be relieved of the burden of transcribing accounts, keeping the record of student's standing, and the many clerical duties incident to the office, and will have time to take up the broader duties contemplated in the organic law of the institution as pertaining to the office.

Mrs. Mary J. C. Merrill, B. S., was graduated from the college in 1881. She entered upon duty as Librarian, July 1st. Her acquaintance with the course of study facilitates the assistance she can render students and others in the use of the library. She has begun the extensive work of cataloguing the miscellaneous matter of the library.

COMMITTEES OF THE FACULTY.

On College Hall—Professor Harrower.

Library Hall—Secretary Baird.

Williams Hall—Professor Satterlee.

Wells Hall—Mr. Frank Kedzie.

Public Exercises—Professors Johnson and McEwan.

Entrance Examinations—Professors Cook, Carpenter, and McEwan.

Studies of Specials of Irregular Students and on Deficiencies—Dr. Beal.

Catalogues—Professor Harrower and Secretary Baird.

Assignment of Students' Rooms—President Abbot.

Farmer's Institutes—Dr. Kedzie.

The Club System—(Appointed by the Board) Messrs. Abbot, Kedzie, and Carpenter.

The Library—President Abbot.

Work done by the College Carpenter—Secretary R. G. Baird, appointed by the Board.

COMMENCEMENT, 1883

Commencement exercises took place on the morning of Tuesday, August 14. On Sunday preceding, President Abbot preached the Baccalaureate sermon. He took for his text the request of Zebedee's children, showing, that like some modern people, they asked for responsibility rather than *fitness for it*, were willing, for example, to become secretaries of state, of war, of the treasury, etc., without the requisite knowledge and experience; asked for place by arbitrary assignment, on account of personal friendship for the one in authority,—a way not in accordance with God's methods; and that they sought for personal gratification rather than usefulness.

The excellent music for the occasion was kindly given by a choir consisting of Mrs. R. B. De Viney, Miss Mabel Paddock, Miss May Murdock, Mr. L. A. Baker, Mr. H. A. Lee, with Miss Alice Weed (class '83) accompanist. Mr. Frank Kedzie took upon himself, at the president's request, the management of the music.

GIFT OF THE GRADUATING CLASS.

On the afternoon of Monday the graduating class presented to the college a beautiful fountain. The presentation exercises took place upon the lawn near the fountain, which was located by Mr. Adam Oliver, the college landscape gardener, near the greenhouse. The presentation speech was made by Mr. Daniel C. Holliday, Jr., the president of the class, and the response was by Dr. Kedzie. It was altogether a delightful exercise. The audience was reminded that the last graduation present to the college was the "big stone" upon the lawn north of Williams Hall, given by the class of 1873, just ten years before.

The senior class day exercises took place on Monday evening, and are spoken of as in every respect doing much credit to the good sense and taste of the class. The class motto was "Deeds, Not Words."

For the exercises of commencement day eight members were selected to represent the class. The music was freely furnished by the Eight O'Clock Club, an amateur orchestra of high merit, to which the college has been previously indebted.

The following is the programme and list of the graduating class.

PROGRAMME.

Overture—Golden Fleece,	Eight O'Clock Club.	Ripley.
Oration—Living the Test of Learning,		Henry W. Baird.
Oration—Higher Education for the Farmer,		Leslie A. Buell.
Airs from Don Juan,	Eight O'Clock Club.	Mozart,
Oration—The Chivalry of To-day,		Wilbur F. Hoyt.
Oration—Youthful Illusions, not all Illusions,		Arthur T. Kinnan.
Princess Alexandra Waltz,	Eight O'Clock Club.	
Oration—The Call for Practical Men,		John T. Mathews.
Oration—Unprofitable Things on the Farm that Pay,		Frank F. Rogers.
Waltz—Snow Flake,	Eight O'Clock Club.	Rescle,
Oration—The Motives of Scientists,		Clarence M. Weed.
Sans Souci,	Eight O'Clock Club.	Ripley,
Conferring of Degrees.		
Benediction.		

NAMES OF THE GRADUATES, CLASS OF '83.

William A. Bahlke, Pewamo.
 Henry W. Baird, Lansing.
 *Albert M. Bamber, Highland.
 Arthur C. Bird, Highland.
 Leslie A. Buell, Chester.
 Ernest P. Clark, Benton Harbor.
 Herbert W. Collingwood, Boston, Mass.
 Henry A. Danville, Jr., Marilla.
 Clark H. Eldridge, White House, Lucas
 County, Ohio.
 Archie M. Emery, Lansing.
 Edward J. Fletcher, Washington, District
 of Columbia.
 Edgar Grimm, B. S., Corvallis, Oregon.
 Daniel C. Holliday, Jr., New Orleans, La.
 Osmond C. Howe, Buchanan.

Wilbur F. Hoyt, Grand Rapids.
 Willard S. Kedzie, Deerfield.
 Arthur F. Kinnan, Lansing.
 Eugene F. Law, Portage.
 Charles F. Lindsley, Highland.
 Albert W. Mather, Battle Creek.
 John T. Mathews, Portland.
 Henry C. Nixon, Bridgeman.
 Frank F. Rogers, Holloway.
 Allen C. Redding, Berlamont.
 Edmund Schoetzow, Volinia.
 Jeddie H. Smith, New Troy.
 Milton St. John, Yates, New York.
 Herbert M. Weed, Lansing.
 Clarence M. Weed, Lansing.
 Sarah E. Wood, Lansing.

* Died June 1, 1883.

The degree of Bachelor of Sciences was conferred on the members of the graduating class, thirty in number, thus bringing the number of graduates up to 302. One of the number, Mr. Edgar Grimm, had previously been graduated from the Oregon Agricultural College. He had spent a year here, and left just before commencement to enter upon the professorship of agriculture in the Oregon College at Corvallis.

At commencement time the degree of Master of Sciences was conferred upon John E. Taylor, class of 1876, for proficiency in agriculture; Charles T. Davis, 1880, professor of chemistry in Colorado Agricultural College; Frank T. Gulley, 1880, professor of agriculture in Mississippi Agricultural College; Louis G. Carpenter, 1879, instructor in mathematics, Michigan Agricultural College; and on Eugene Davenport, 1878, for proficiency in agriculture.

The name of Albert M. Bamber appears in the list of graduates, and would have appeared on the list of speakers but for his removal by death, June 1, 1883. Mr. Bamber was one of the noblest students the College ever had. At the time of his death he was president of the Young Men's Christian Association and of the College Students' Organization, and one of the club stewards. He had a brother graduated in 1881. At the request of his class, a diploma was made out for him and presented to his father. When the body of Mr. Bamber was taken from the College, his class, his fraternity, the Y. M. C. A., and his club sent delegates in token of respect and affection, and the president preached a memorial sermon for him and Mr. Charles E. Bush.

Mr. Charles E. Bush, son of J. J. Bush, Esq., of Lansing, was graduated in 1881, and soon took charge of a part of his father's business in Pentwater. In about a year his health began to fail, and he in vain tried the climate of Florida. He died of consumption, departing in great peace, and dearly beloved for a soul full of lovable qualities, and scarcely a discernible fault, May 6, 1883.

In the afternoon of commencement day, the Hon. Edwin Willits, late member of Congress, and now principal of the State Normal School, on the joint invitation of the graduating class and the literary societies of the College, delivered an address in the College chapel. The theme was "The future of Agriculture," and it was handled in a highly instructive and interesting manner.

The president's reception on commencement evening closed the exercises of the (if we include 1880) twenty-third commencement season of the College.

STUDENTS.

The attendance at the College for the three terms ending August 14, 1883, was as follows:

Resident graduates.....	3
Seniors.....	31
Juniors.....	33
Sophomores.....	56
Freshmen.....	57
Specials.....	5
Total.....	185

States and counties were represented by students as follows:

Allegan.....	3	Ottawa.....	1
Alpena.....	1	Shiawassee.....	5
Baraga.....	1	St. Joseph.....	5
Barry.....	8	Van Buren.....	8
Berrien.....	9	Washtenaw.....	3
Branch.....	5	Wayne.....	2
Calhoun.....	4		
Cass.....	1	Total.....	147
Charlevoix.....	1		
Clinton.....	6	FROM OTHER COUNTRIES AND STATES.	
Eaton.....	7		
Emmet.....	1	California.....	1
Genesee.....	1	Connecticut.....	2
Gratiot.....	1	Dakota.....	1
Hillsdale.....	3	District of Columbia.....	1
Huron.....	1	England.....	1
Ingham.....	23	Illinois.....	3
Ionia.....	9	Indiana.....	3
Jackson.....	3	Japan.....	1
Kalamazoo.....	4	Louisiana.....	1
Kent.....	5	Massachusetts.....	1
Lapeer.....	1	New York.....	5
Leelanaw.....	1	Ohio.....	5
Lenawee.....	5	Oregon.....	1
Livingston.....	6	Pennsylvania.....	2
Macomb.....	1	South Carolina.....	1
Manistee.....	2	Texas.....	1
Menominee.....	1	Vermont.....	1
Muskegon.....	1		
Oakland.....	8	Total.....	31

The average age of the various classes was as follows: Seniors, 21 years 7 months; Juniors, 21 years 7 months; Sophomores, 21 years 2 months; Freshmen, 23 years; Specials, 22 years 8 months.

COURSE OF STUDY.

The course of study has undergone important changes, by which Seniors are permitted each term to select three out of five studies. This is a step toward enabling students to secure a more thorough knowledge of some chosen branch of science or of practice. The course in Veterinary has been extended from a half term to three whole terms. This time is still insufficient to make a Veterinary Surgeon, but is sufficient to give a farmer such a knowledge as the best of them would like to possess, without pretension to the thoroughness of the professional man.

The courses in the various departments have been enlarged to as great an extent as the officers in charge thought that they had time and strength to warrant additions. A half term in Botany and Forestry, a term of instruction in Agricultural Engineering, a term in Quantitative Analysis, for which new and beautiful rooms have just been fitted up, an additional term in Horticulture, and the Veterinary already mentioned are the additions to the course.

The whole course in Chemistry has been put two terms later in the scheme of study; and a half term of Agriculture, Botany, and Moral Philosophy transferred each from the Senior to the Sophomore year.

FRESHMAN YEAR.

Autumn Term.

Algebra.
Ancient History.
Rhetoric.

Spring Term.

Geometry.
Drawing.
Agriculture.

Summer Term.

Geometry completed.
Botany.
Rhetoric.

SOPHOMORE YEAR.

Autumn Term.

Algebra completed.
Astronomy, half term.
Moral Philosophy, half term.
Botany.*
Agriculture.*

Spring Term.

Trigonometry, half term.
Surveying, half term.
Botany—Laboratory work, two hours daily.
Rhetoric.

Summer Term.

Mechanics.
Elementary Chemistry.
Agriculture.*
Landscape Gardening.*

JUNIOR YEAR.

Autumn Term.

Mechanics completed, half term.
Anatomy, half term.
Horticulture.
Organic chemistry.
Blowpipe and Volumetric Analysis.

Spring Term.

Human and Comparative Physiology.
Analytical Chemistry—Laboratory work, three hours daily.
Horticulture—Lectures (elective instead of the third hour of chemistry.)

* These studies alternate throughout the term.

Summer Term.

Entomology.
English Literature.
Agricultural Chemistry.

SENIOR YEAR.

Autumn Term.

Psychology.
Chemical Physics.
Zoölogy, half term.
Agricultural Engineering.
Veterinary.

Spring Term.

Logic.
Meteorology.
Civil Engineering.
Constitution of the United States.
Political Economy, half term.
Veterinary.
Geology, half term.

Summer Term.

Quantitative Analysis.
Botany, and Forestry.
Agriculture, half term.
Veterinary.
English Literature, half term.
Philosophy of history, half term.
Astronomy, half term.

RHETORICAL EXERCISES.—The students meet weekly, in classes or divisions, for rhetorical exercises. The following scheme indicates the work required throughout the course:

FRESHMAN.

First Term.—Essays once a fortnight in rhetoric class; two declamations.

Second Term.—One exercise a week reading and studying some English classic.

Third Term.—Essays in rhetoric classes; declamation every three weeks.

SOPHOMORE.

First Term.—Declamations and essays, three exercises.

Second Term.—Essays in class in higher English; two declamations.

Third Term.—Two original declamations delivered before the class.

JUNIOR.

First Term.—Two essays, on assigned subjects; public orations.

Second Term.—Three essays in rhetoric class; public orations.

Third Term.—Two critical essays in English literature; public orations.

SENIOR.

First Term.—Two essays, on assigned subjects, or debates; public orations.

Second Term.—Two essays on assigned subjects; public orations.

Third Term.—Two essays; public orations.

PUBLIC EXERCISES.—Upon each alternate Wednesday, members of the Junior and Senior classes deliver orations in presence of all the students. Two orations are to be thus presented by each student during his junior year, and two during his senior year.

Upon each Wednesday not thus occupied, some member of the faculty or a gentleman from abroad lectures to the students in a body, upon some topic connected with their course of study or their work.

LABOR.—Each student, not exempt on account of physical disability, is required to labor three hours each week day (except Saturdays) in those seasons of the year when labor can be furnished. Students receive remuneration for most of their labor in the quarterly settlement of accounts, at the close of each term, at a rate depending on their ability and fidelity, the maximum being eight cents per hour. The labor is to some extent planned with reference to illustrating and applying the instruction in the lecture room. The work during the junior year is performed on the gardens and grounds. Six hours are spent each month, without compensation, under direct instruction in practical horticulture. The Sophomores work for the year on the farm; the members of other classes are assigned to the farm, the gardens, or some other duty.

SELECT COURSE.—Persons of suitable age and acquirements, who desire to pursue one or more of the branches of study more closely related to agriculture (such as chemistry, botany, animal physiology, apiculture), may be received for a less time than is requisite for the full course. By reference to the scheme of recitations in the catalogue any person desiring select studies can ascertain whether the classes are so arranged as to permit him to pursue them.

CLUB SYSTEM OF BOARDING.

The students' organization, a society consisting of all the students, held a meeting in the College chapel Nov. 13, 1882, and adopted a plan for a club system of boarding and submitted it to the State Board of Agriculture for approval. After careful consideration the Board adopted the plan, and authorized the students to divide themselves into five clubs, to elect stewards, and begin on the new system with the opening of the spring term, 1883. Three club dining rooms were made out of the one dining hall in Williams Hall, and two out of the old armory in Wells Hall; rooms were assigned to the cooks in each hall, and a committee of the faculty was appointed by the board, with whom the club officers could consult. President Abbot, Dr. Kedzie and Prof. Carpenter constitute the committee. The general arrangement of room, disposal of college property used in the old system, and many other matters of detail, were committed to the charge of Professor Carpenter, with whom the students had taken frequent council in maturing their plans. Mr. Carpenter continues to be the chief adviser of the stewards, and the success of the system is largely due to his assistance.

The club system has been tried for one year, or for the spring, summer, and autumn terms of 1883, with very gratifying success. Board was at once

reduced from \$3.00 to \$2.50, which was as low as the students themselves desired that it should go. The food has been better, and served warmer than before, and the comparative fewness of those dining together has given somewhat of a home-feeling at the meals, which before was wanting. As the clubs own certain property, new students purchase certificates of membership, which are redeemed at their face value when the student leaves college. These certificates were sold for \$2.50.

The experience of the year suggested to the students certain changes, which were adopted in November, 1883, and which are incorporated in the following :

CONSTITUTION OF THE CLUB BOARDING ASSOCIATION.

ARTICLE I.—The association shall be known as the Club Boarding Association.

ARTICLE II.—The members of this association shall be students of this college who hold boarding club certificates in their respective clubs. These certificates shall be redeemed by the steward at the face value on occasion of the holder leaving college.

ARTICLE III.—Section 1. The officers of this association shall be the president and secretary of the students' organization, and the secretary of the college, who shall act as the general treasurer of the association.

Sec. 2. The duty of the treasurer shall be to receive all money from the members and place the same to the credit of their respective clubs.

Sec. 3. The treasurer shall pay out said money only on orders drawn by the several stewards.

ARTICLE IV.—The students shall be divided into clubs. The membership of a club shall not be less than twenty, or more than forty.

ARTICLE V.—No club shall be allowed to have a majority of its members belonging to the same class or society.

ARTICLE VI.—The division into clubs shall be effected by a standing committee of three, elected by the association. This committee to be known as the committee on membership, and shall be elected for one year at the time of the regular election of officers of the students' organization. The first division shall be made by taking each alternate group of five from the list of names as found in the catalogue.

ARTICLE VII.—New students and those expecting to enter College, may be temporarily assigned to any club by the President of the College. They shall be permanently assigned to their places by the Committee on Membership.

ARTICLE VIII.—With the consent of the Committee on Membership, students may change to any club providing such change does not conflict with Articles IV and V.

ARTICLE IX.—Section 1. The clubs shall be designated by letters.

Sec. 2. Each club shall elect a steward whose term of office shall be one term.

Sec. 3. The election of stewards shall be by ballot, and held four weeks preceding the end of the term. The election of the steward must be approved by the President of the College.

Sec. 4. No senior shall hold the office of steward during the summer term.

ARTICLE XI.—Section 1. Each club shall elect an auditing committee consisting of two members; they shall be elected the last week of each college term.

Sec. 2. Their duty shall be to examine the accounts of the steward and report to the club at the middle and end of each college term.

ARTICLE XII.—Section 1. Each member of the association shall be required to deposit twenty dollars (\$20.00) at the beginning of each term with the treasurer, and will be admitted to the club only on presentation of this receipt to the steward of his club.

Sec. 2. The steward of any club is forbidden to allow members to remain in his club unless they keep deposited with the treasurer to their club's credit, the price of one week's board in *advance*.

ARTICLE XIII.—Clubs shall be in running order the day preceding the opening of each term.

ARTICLE XIV.—Amendments to this constitution may be made at any time by a majority vote of the association.

MILITARY.

But little is to be added to what was reported last year, report 1881-2, page 33. All the arms and accoutrements on deposit at the college were recalled by the Quartermaster General of the State and were returned to him. As he expressed a doubt of his authority to deposit arms at this place, the Legislature of 1883 passed the following enactment No. 165, public acts of 1883, approved June 6, 1883:

An act to authorize the Quartermaster General to deposit arms and accoutrements at the Agricultural College.

Section 1. *The People of the State of Michigan enact*, 'That the Quartermaster General be authorized, with the advice and consent of the Military Board, to deposit with the State Board of Agriculture, at the Agricultural College, arms and accoutrements for the use of said college.

Ordered to take immediate effect.

SIGNAL SERVICE STATION.

In the autumn of 1882 I was appointed, with Dr. Kedzie, a committee to confer with the Signal Service Bureau at Washington, regarding a signal service station at the college for the benefit of the farming community. The committee was appointed at the request of Gov. Jerome, with a view to State aid if it should be requisite. My part of the work of the committee was secondary to that of Dr. Kedzie, and I refer to his report of the chemical department, for further information regarding the matter. Nothing was done in 1883, but in the winter of 1883-4 Col. Wm. B. McCreery, member of the Board, was directed by the Board to represent the desirability of the establishment of such a station to the authorities at Washington. And now while revising these sheets for the press, Feb., 1884, comes the word officially that Brigadier General W. B. Hazen, chief signal officer, has determined to establish such a station at this college, if the needed appropriations for his department are made to it.

The assistant chemist of the college is in communication with the telegraphic world, through lines, batteries, and instruments of his, in his office in the chemical laboratory, all of which as well as the use of meteorological instruments, he proposes to put to the service of the signal service. Dr. Kedzie has long thought it worth the trying, to see if some ways can not be devised to bestow on farming communities the same kinds of service which the signal service extends so beneficially to commerce. Should the station be established here, the Board of Agriculture will, I suppose, make the department under Dr. Kedzie, the medium of the connection of the station and the college.

JUNE MEETING OF THE BOARD.

The Executive Committee and officers of the State Agricultural Society, the State Horticultural Society, and the State Grange were the guests of the Board of Agriculture at the College, June 13. The forenoon was spent in an examination of the condition of the college. There was a pleasant gathering including students and the families at the college, as well as the visitors, the faculty and the Board in the general lecture room in the afternoon, and addresses were made by the Hon. Philo Parsons, President of the Agricultural Society, the Hon. Witter J. Baxter, one of the early members of the College Board, and others.

Two of these societies appoint committees in the College who inform themselves by personal examination of the doings of the Board and Faculty, and who give us the benefit of their suggestions. These committees have made formal reports which appear in their printed transactions.

President Fralick of the State Agricultural Society, in his annual address in 1883, says: "For the last four years by the invitation of the State Board of Agriculture and officers of the Agricultural College, this committee have enjoyed the pleasure of visiting and examining the college, its school and lecture rooms, classes and manner of teaching their pupils, its farm and farm buildings, and valuable improved stock, and the manner of cultivating their land."

The State Horticultural Society, without appointing a Standing Committee on the college, has always been closely united to the college in interest and in the persons of its officers.

In the inaugural address of the present President of the Society, delivered January 14, 1884, the Hon. Philo Parsons says:

"It appears desirable that your periodical visits to the Agricultural College should be continued. This institution was an outcome of your Society and mainly through its influence was secured to the farmers of Michigan. Its history from the date of its origin to the present moment shows that no mistake was made when the Legislature appropriated the required funds for its existence. It is to our credit as a State, also, that it was in the thoughts and hearts of the people, and a fixed fact, before the national government made appropriations that secured such institutions for all the States. Our own Agricultural College stands pre-eminently first, and its practical teachings and beneficent influence are effecting a radical improvement in the intellectual character, daily lives and tastes of that great class of our community for whom it was specially established. The farmer's institutes held in different sections of the State, though too few in number, have stimulated thought, created a higher ambition and a more appreciative sense of the character and dignity of agricultural life and occupation. But the near future is still more to vindicate the wisdom of securing this institution for the farmer. The influence of fifty per cent. of the students graduated, returning with new tastes, matured thought, cultivated intellects, men of wisdom and practical judgment, to the farm, cannot be overestimated. It will be the heaven which is to lift the farmers of Michigan upon a higher plane, and furnish men who are to properly represent their interests in legislative and congressional halls, as also to secure a more intelligent and economical cultivation of the soil. But there is yet an incompleteness in this institution. The mechanical department is still wanting. A liberal appropriation, securing this, will greatly augment its power for good to a much larger and different class of students. I submit whether some action on your part may not hasten a movement of the Legislature in this behalf."

The Committee of the Society, appointed in the College, made the following report:

To the Executive Committee of the State Agricultural Society.

Your Committee appointed at the last winter meeting to visit the State Agricultural College during the year and report to you at this meeting their views of the

condition of this State Institution, would report that in company with the President of this Society and members of the Executive Committee, with other prominent agriculturists of the State, we visited the College on Wednesday, June 13, 1883, and were cordially received by its president and faculty, who were untiring in their efforts to give us every opportunity to view the College in all its departments. We spent the day in examining the buildings, the grounds, the stock, the grain, grapes, and fruits, as well as the departments of Education, and found them in complete order, and we see no reason, with the ample provision made by the State for the encouragement of the science of agriculture and a thorough knowledge of all its branches, why the young men and ladies of this State who desire a practical education should not avail themselves of its privileges. In the annual visits of this Society to the College, your Committee believe that improvements are being made and the Agricultural College is attaining that standing which is a credit to the agriculturist of the State of Michigan, and every effort should be made on the part of this Society to aid the State Board of Agriculture in their efforts to make this a model institution, for its practical instruction in the science of agriculture.

All of which is respectfully submitted.

WM. CHAMBERLAIN.
A. F. WOOD.
JOHN LESSITER.

In the report of Hon. C. G. Luce, Master of the Michigan State Grange, presented to the National Grange on the second day of the session in Washington, in December, 1883, he says:

"For several years our State Grange has appointed a standing committee upon the Agricultural College, with instructions to visit the institutes when in session, examine, commend, criticise, or suggest as in their judgment the case requires. This course has brought the Grange and College into very close and very friendly relations. This has done much to strengthen the college with the public. And to-day it is not claiming too much to say that it rests on as solid a foundation as any of our institutions. It now ranks with any of them in confidence, esteem, and usefulness, in a State that we believe to be justly proud of its educational and charitable institutions.

"The farmers are more and more, each year, taking charge of it. This is true of the people at large, on the board of agriculture, and in the Legislature. More and more they are feeling that it is *our* college. The whole number of students in attendance during the year 1882 was 216. The average for ten years has been very nearly 200. A large number of these never complete the course. Some of them come in as specials, to study some specific subject. And some commence with the intention of completing the course, but for various reasons fall out by the way. The whole number of graduates in the twenty-three classes, has been 272. The smallest graduating class was in 1862, consisting of only five students. The largest was in 1881, and consisted of thirty-three. Of the 272 graduates, 103 are farmers, 60 others are engaged in various industrial pursuits; 109 are in the profession, or engaged in commercial pursuits. Of course all of the graduates are comparatively young men.

"It is too early to take the full measure of their success, or want of it. More than seventy of these graduates are on farms in the State of Michigan. I enjoy the personal acquaintance of many of them, and know that they are adding materially to the intellectual forces to be found on the farms. And they are thus aiding the tillers of the soil, in building upon the only real solid foundation, *knowledge*. I venture the assertion that full as many of these students remain on the farms as would have done so if they had not enjoyed the benefits of a college education, and many more than would have done so if they had graduated at our University. While there is still room for improvement, as all will admit, yet we do know that our college is doing much to educate the farmers of the State. And we shall hail with delight the day when graduates of the Michigan Agricultural College are to be found on the farms in every neighborhood and township. No one now questions that it was the height of wisdom to maintain it as a distinct agricultural school, with its one single department."

NATIONAL AGRICULTURAL CONVENTION.

The Hon. George B. Loring, United States Commissioner of Agriculture, called a series of several conventions on various departments of agricultural

practice, in Washington, in December, 1882, and again in December, 1883. To the first series of conventions the Hon. F. Wells, and Secretary R. G. Baird were sent as delegates; to the last series the president of the college was sent. Full stenographic reports of each series have been published by the Department of Agriculture, making an extended account of them in this place unnecessary.

The conventions called together a large number of gentlemen distinguished in their several branches of agricultural study and practice, and I believe it is the universal opinion of the delegates that these conventions have been of essential service in awakening interest in various important desiderata of agricultural practice, and directing effort toward their elucidation.

While I was at Washington action was taken having reference to securing government aid to carry on agricultural experiments at the various agricultural colleges, and the following circular, prepared by President Knapp of the Iowa Agricultural College, has been circulated.

A very important measure to aid practical science is now pending before Congress. On the 10th of December, 1883, the Hon. A. J. Holmes, of Iowa, introduced a bill "To establish National Experiment Stations in connection with the Agricultural Colleges of the various States."

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in order to enable the Department of Agriculture to fulfill the design and perform the duties for which it was established, as declared in the organic act creating the said Department, to-wit, "to acquire and diffuse among the people of the United States useful information on subjects connected with agriculture in the most general sense of that word, and to procure, propagate, and distribute among the people new and valuable seeds and plants," institutions shall be established in connection with each of the agricultural colleges in the States providing such colleges, with an improved farm in connection therewith, and placed under the conduct of such colleges, to be called and known as "national experiment stations."

SEC. 2. That it shall be the object and design of the said national experiment stations to conduct original researches or verify reported experiments on the physiology of plants and animals, the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at their different stages of growth; the comparative advantages of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclimation within the isothermal limits represented by the climate of the several stations and their vicinity; the analysis of soils and waters; the chemical composition of manures, natural or artificial, with experiments designed to test their comparative values for raising crops of different kinds; the composition and digestibility of the different kinds of food for cattle; the scientific and economic questions in the production of butter and cheese; and all other researches of experiments bearing directly on the agricultural industry of the United States.

SEC. 3. That the said experiment stations shall be placed under the general control of the regents or trustees of said agricultural colleges, who shall have power to employ a professor for each agricultural college who shall act as superintendent of the experiment stations established under this act.

SEC. 4. That the said professors shall make such reports to the Commissioner of Agriculture from time to time as he may direct. The general character of the work and of the experiments to be performed at each station shall be determined by the Commissioner of Agriculture, the president of the college where the station is located, and the professor in charge of said station.

SEC. 5. That to each agricultural college providing for experiment stations under this act, to pay the salaries of the professors and superintendents of the said experiment stations, the wages of the laborers employed in their operations, and the cost of the experiments and researches connected with their conduct as heretofore specified, the sum of fifteen thousand dollars is hereby appropriated out of any money in the treasury not otherwise appropriated, or so much thereof as may be necessary to cover expenditures actually made for said purposes; the money to be drawn quarterly from the treasury of the United States, upon a certified statement of the amounts actually expended at each station, properly indorsed by the college board of audit, the professor in charge, and the Commissioner of Agriculture.

SEC. 6. That upon the passage of this act, before the agricultural college in any State can draw any funds as provided, the legislature of such State shall pass an act accepting such trust and agreeing to conduct an experiment station in accordance therewith.

In the 47th Congress the Hon. C. C. Carpenter, of Iowa, introduced a bill, substantially the same as the foregoing, which was referred to the committee on Agriculture.

At a meeting of the delegates from the several Agricultural and Mechanical Colleges, called by Commissioner Loring, for January, 1883, this bill was perfected as here printed, and the following standing committee was appointed by Dr. Loring to have the matter in charge:

President Knapp, of Iowa,
 President Abbot, of Michigan,
 President Peabody, of Illinois,
 President Chadbourn, of Massachusetts,
 President Lee, of Mississippi.

In the 48th Congress this bill was promptly introduced by Hon. A. J. Holmes, of Iowa.—H. R. 447.

It should not be necessary at this time to enter into a discussion of the value of agricultural experiment stations. The importance of a body of scientific experts and observers in the leading industries, has been fully recognized in Europe, and their beneficial labors are understood by well informed men in this country. In the United States we have the anomaly, among enlightened nations, of a people, the prosperity of which depends largely upon sustaining agriculture, and upon eliminating from it the uncertainties of production, failing to support their interests and deflecting their school funds almost entirely to other lines of education.

With no agricultural instruction in the common schools of the country, what can one or two stations on the Atlantic coast do towards educating half a continent in the broad domain of agriculture? As well might a single cannon, planted on Bunker's Hill, defend the seaboard cities of the nation from the combined attack of the navies of the world.

There are, therefore, many important reasons why this bill ought to become a law; to some of which allow me to call public attention:

1st. The diversity in climatic conditions in the United States is so great that any attempt, by a single station, to give information of general value, must be limited to pure scientific statements, so narrow as to fail in accomplishing the work designed; or allowing greater latitudes of advice, such statements would be misleading in most sections of the country. The fruit trees, many of the forest trees, the wheats, the corn, the oats, etc., adapted to the Atlantic States, are totally unsuited to Iowa, and to nearly all that great territory between the Mississippi and the Rocky Mountains; and a positive damage has been done to this mid-continent section by the distribution of the plants and seeds suited to a moist climate. A similar statement may be made in regard to other sections of the United States.

This diversity in climatic conditions is so great as to include not only the plants, but all that relates to their production, the sales and the methods of retaining or restoring their fertility and nearly all the processes in the wide domain of husbandry.

2d. The distribution of seeds and plants, to be valuable, must be done with intelligent reference to the requirements of the several localities to which they are sent. Marked climatic differences frequently exist within the limits of a State, requiring close discrimination in the dissemination of plants.

3d. The domain for experiment is very wide, covering such countless things and details as to almost overwhelm the investigator upon the threshold of his inquiries.

Judicious selection from the multitude, is of primary necessity, and an experiment station is valuable in proportion to its considerate selection of the more important lines of agricultural investigations, and its devotion to them of most careful attention. Agriculture in the United States is so diversified that it requires stations devoted to the specialties of the several divisions, and so located as to make the tests under conditions similar to those in the districts to be benefited.

To intelligently carry out the purposes for which the Department of Agriculture was created, to wit: "To acquire and diffuse among the people of the United States, useful information on subjects connected with agriculture, in the most general sense of the word, and to procure, propagate, and distribute among the people, new and valuable seeds and plants," requires that experiment stations be established in every State; and it remains only to notice some of the features of this bill.

It is not presumed that any one favorable to station work will object to sections one and two of this bill.

The union of the stations with the several Agricultural Colleges, is based on the following reasons:

1st. Economy. Each college has buildings and apparatus (including farm) for such purposes, which could not be specially provided for many thousands of dollars.

It has its organized board of trustees and a faculty that can give important aid.

2d. The investigations would be of great benefit to the students of the colleges as object lessons, and would perfect and give practical value to the work of the colleges, as contemplated in the original law creating them.

Section 4 wisely gives to the Commissioner of Agriculture such a relation to these stations as will systematize their work throughout the United States, and will avoid too much repetition of experiments at different stations.

To the great work of establishing Agricultural Experiment Stations, we invite the attention of the thoughtful men of this country, and ask their aid, so far as they can indorse the views here presented.

Respectfully,

S. A. KNAPP,

President of the Iowa Agricultural College, and Chairman of the committee, appointed by the Department of Agriculture, on experiment stations at the several Agricultural Colleges.

The matter of experiment stations has been discussed in the State agricultural societies, the State grange, and in the pomological and horticultural societies of the State, and an earnest desire expressed that such a one should be established. I find in a published address before the pomological society at Allegan, February 19, 1884, by Mr. A. J. Bracelin, a student in the college in 1867 and 1868, a portion of a letter of mine, giving my idea of the relation of an experimental station to the college, which I take the liberty to transcribe. Mr. Bracelin says:

I have conferred with President Abbot, and take pleasure in submitting to you his estimate of such a department and his plan of how it should be conducted. He says: "You ask, 'Would a farmer's experiment station, added to our agricultural college, be beneficial to the practical farmer and horticulturist?' The term 'experiment station' is somewhat vague, but I have no hesitation in saying that, in the sense in which I understand it, such a station is highly desirable. I would not think it well *for the college*, however it might be with the science of agriculture, to plant here an experiment station to be conducted independently of the various departments at the college, and of their separate heads; but if the term means such an enlargement of force and means as would enable our officers greatly to extend their experimental work, I say yes. We have ordinarily done at this college, I believe, more experimenting than any simply experiment station in the United States. It is rather an extension of our work than a superseding of it by a foreign set of workers with new laboratories, that seems to me to be needed. Take for example chemistry. Artificial fertilizers are beginning to be used in this State more than ever before, especially, perhaps, by horticulturists. Now, many of the experiments that would naturally be tried would require the joint efforts of a skillful, well-read horticulturist, and of a chemist. We have three, and under their directions and immediate oversight, young graduates could do the work which would otherwise call for separate men of high attainments and salaries. I do not speak of the government inspection of phosphates and other fertilizers offered for sale, because any good chemist, authorized by the State courts, would suffice, probably, for that simply; and yet there might be an advantage in having that work done in a place where any practical question might receive a practical test. Such inspection forms a large part of what is done in many experiment stations.

"But if the questions before an experiment station were such, and involved one, as the source of nitrogen in plants—such as Dr. Kedzie has been engaged in—what could such a station do? The persons competent to perform such experiments are so very few that a small number of stations would exhaust the supply in the country, and an independent station of such investigation would require laboratories, apparatus, and a high-priced chemist, and might as well be in one place as another. My plan would be to give our chemist, who is one of the few competent men, all the skilled help he needs, and such a limited field of labor that he can do the work. One head, of course, must plan and direct, while much detail work could be done by such graduates as develop an aptitude for the work, while not improbably such practice here might develop and bring into the field, in time,

independent and skilled investigators. Take another example. Dr. Beal recommends, for good reasons, the trial of some of the not so well known grasses. Experience has shown that seeds true to name are only to be got when you have a competent botanist to distinguish them. Now, professional botanists are few, but we could here easily find graduates who, under proper instructions, could learn to make an inspection of seeds. Would it not be better and more economical to have such necessary inspection done here, with a botanist known to be competent, than to set up an independent station under new officers? Here, too, the botanist and the horticulturist, or the professor of agriculture, could act in unison. These are illustrations. When our professor of agriculture experimented in ensilage, he employed graduates to take immediate charge of feeding and weighing. When Dr. Kedzie experimented with sorghum he had some of the work and some of the analyses made by graduates. It might be necessary, in experimenting in fruit trees and nurseries, to go a few miles away from the college for suitable sites; but in the main we have both men and facilities, and only need the larger force and outlay to make right here the experiment station which is desired."

Commissioner Loring was freely consulted as to some plan for the establishment of such stations, and his hearty sympathy and good sense were of essential service in making out a trial plan, such as is given above.

Some such plan seems to be the best that has been devised to give some unity and sufficient aid to the attempt to transform agriculture from an empirical art to a true science.

T. C. ABBOT,
President.

REPORT OF THE PROFESSOR OF AGRICULTURE AND SUPERINTENDENT OF THE FARM.

To the President of the College:

I herewith submit my report of the work of the Farm Department, for the College year, ending September 30, 1883:

INSTRUCTION.

The Freshman class, in two divisions, met me daily during the spring term for lectures on drainage, breeds of domesticated animals, their characteristics and adaptation to particular purposes. The interest of the class in the subjects discussed was a matter of encouragement to me. Not a single member failed to pass a satisfactory examination at the close of the term. The class room instruction was supplemented by visits to the barnyard, where our best specimens of the different breeds were critically examined, their defects as well as good points noted and each member of the class was required to mark the animal according to the approved scale of points adopted by the leading breeders.

During the summer term I lectured daily to the Seniors on the Principles of Stock Breeding, the Feeding of Animals, Rotation of Crops, Farm Buildings and Implements, Manures, Farm Economy, the Law and the Literature of the Farm.

During the present term I am lecturing alternate days to the Sophomores. This is a new arrangement, but one which I have desired ever since my connection with the College. In my last report I said "the Sophomores are now and have been for years assigned to the farm for labor the entire year; but as Professor of Agriculture I do not have a single opportunity to see them in class

room during this time. It seems to me this is a grave mistake." It was somewhat difficult to arrange the programme of studies so as to effect this change; but after much effort and mutual concessions the plan has been adopted. I feel confident that it will add to the efficiency of the department. We are completing our studies of the different breeds of domestic animals and their characteristics, at present. The new plan provides that the Sophomores shall have lectures on Practical Agriculture alternate days of the summer and autumn terms.

The whole number of students who have received instruction in Practical Agriculture in the classes named was one hundred and fourteen. Their diligence and deportment has made the work of instruction a pleasant task.

I have taken my regular assignment of the Wednesday afternoon lectures. My topics have been "Farm Economy" and "The Ontario Agricultural College." I attended the Farmers' Institutes to which I was assigned by the Board of Agriculture in Barry and Muskegon counties, and also at the request of Prof. Carpenter, filled his appointment at the Farmington Institute. I have attended local Institutes at Mason and Eaton Rapids by invitation and lectured at both places. The interest in these farmers' meetings is increasing and they are contributing in no small degree to arouse increased attention to the best methods of modern agriculture. We meet the most intelligent, the best farmers at these Institutes and in mutual association, and the discussion of topics in which we have a common interest, we are mutually benefited. As teachers we come to have a keener, more practical appreciation of the needs of agriculture. Our theories of agricultural science are possibly exploded or greatly modified by the criticisms of intelligent farmers, who are not slow to find the holes in our skimmers. On the other hand prejudices against the College, against agricultural education and agricultural teachers are often found to be the result of a misapprehension of facts, which this personal association serves to dissipate. That the Institutes have been a most efficient means of popularizing the College with the farmers cannot be questioned.

TEACHERS OF AGRICULTURE.

By the favor of the Board of Agriculture I was permitted to attend the annual meeting of the Teachers of Agriculture at Columbus, Ohio, July 4th and 5th. Representatives from the Eastern and Western Colleges were present. The meeting was quite informal. We were very cordially entertained by the Faculty of the Ohio State University, who gave us the best facilities for inspecting the laboratories, the farm in charge of Prof. Townsend and the Experimental Station, with Prof. Lazenby at its head. The association meets next year at Cornell University.

At the September meeting the Board of Agriculture authorized Hon. Franklin Wells and myself to attend the Provincial show held at Guelph, Ontario, September 24 to 29, and to also visit the Ontario Agricultural College, with the view of learning what we could of its methods of work and practical management. Mr. Wells was unavoidably detained at home, to my regret, and I made the trip alone. My visit was a very enjoyable and profitable one—made doubly so by the kind attention and hospitality of President Mills and Prof. Brown of the College. My impressions of the College and the Fair were embodied in the lecture to the students referred to elsewhere and in a report to the Board of Agriculture at their November meeting. The College, under its present efficient management, is doing capital work for Canadian Agricult-

ure,—is growing in favor with the farmers, and though young in years is pushing its way to the front rank of the industrial schools of the country.

EXHIBIT AT STATE FAIR.

By the order of the Board a draft of Short Horns and Ayrshires from the College herds was exhibited at the state fair. The animals were shown in their respective classes and treated exactly as other exhibits by the judges. Premiums were awarded to the college stock to the amount of ninety dollars. Upon my recommendation the board authorized me to return the order for this amount to the secretary of the State society.

IMPLEMENTS.

A Buckeye mower was purchased of Mr. Rolla Bryan, general agent for the State, in June last. Another five-inch tire wagon from Messrs. Harvey & Gregg, of Constantine, has been purchased. I am convinced that a narrower tire would not be as desirable for farm work the season through; hay racks of Mr. A. G. Barton, Constantine. All implements have been repainted, and in our commodious tool-house are always sheltered when not in use. The new grain barn, so planned as to save the straw when threshed in the barn, is proving very servicable. More or less straw was always wasted in stacks—now everything is saved—no small item when we utilize all this straw, in combination with other foods, in keeping our large and rapidly increasing herds.

AGRICULTURAL CLASS ROOM.

In my last report reference was made to the needs of the department in this regard. The old library room in College hall was assigned for this purpose, and the Board authorized me to expend \$500 in putting in new floors, blackboards, tables, seats, and furnishings. The work was completed in July, and I am using the room for this term's work. I have an office in the northwest corner 12x24. The main class-room is 35x40. It is well furnished and arranged for my classes, and as I have had up to this time since my connection with the college no fixed habitation, having met my classes in the chapel, the mathematical room, Prof. Beal's laboratory, and the model-room, I think I am able to very fully appreciate the pleasant quarters I now enjoy.

To Hon. Franklin Wells who suggested and secured the assignment of this room for my department, and to the members of the board, who have authorized its equipment, I desire to record my hearty appreciation and gratitude. A good, commodious class-room and office, furnished with desirable appliances, for use and illustration in class-room work in practical agriculture, cannot fail to give the department a higher vantage ground, and ought, and I believe will, greatly increase the efficiency of my work.

EXPERIMENTS.

The peculiarly unfavorable season has made our experiments almost a total failure. The nitrogen experiment reported last year, was continued, but on account of the drowning out of the crop early in the season, and the frost in September, it was a failure. Our grass plats were productive, but the unfavorable weather prevented proper curing. The products of some plats were worthless. Our experimental wheats suffered in the same way, so as to greatly impair anything like a fair showing. Experiments to determine the depth at which certain seeds germinate, and the effect of deep and shallow covering are herewith appended. Sophomores Sheldon, Watkins, Snyder, and Waldo rendered excellent service. Several new varieties of potatoes were purchased and

planted. Under my supervision Sophomore French, of Paw Paw, had charge of the work, from the planting until stored in the cellar. His interest in the work, his habit of observing and noting in detail points of interest during the growing and ripening season, are apparent in the report of these experiments.

ENSILAGE.

The report of the ensilage experiments for 1882 and '83, was published in the report of '81 and '82, so as to get them out a year earlier than if retained for this report. Reference to that report will show that we still have faith in ensilage, as a cheap substitute for roots, and in connection with other foods. The extravagant claims of some enthusiasts are to be deprecated, but that by this method a large quantity of good, succulent forage can be cheaply secured from a small area, will not be questioned by those who have given the subject sufficient attention to enable them to express an intelligent opinion.

EXPERIMENTAL FEEDING OF STOCK.

The increasing attention paid to stock in this country, its financial value as the right arm of our agriculture, demands that we do something in the way of experimental feeding. The field is a wide one, and seems to promise as much or more in the way of service to the agriculturist, than any other.

Ought not this college to be provided with the proper facilities for this work? First in order is a suitable building, in which the experimental animals and food can be entirely separated from the main herds, and so planned that the most perfect accuracy, in every detail of the work, might be secured. I trust that this matter may receive the favorable consideration of the board of agriculture, and that provisions may be made for more and better work in this direction.

STUDENT LABOR.

In my last report in discussing the difficulties connected with our system of student labor I suggested, as the practical solution of supervision, the employing of senior students for this work. I said "*make those who have always been attentive to labor duties since entering the College, and have acquired some skill in the details of farm operations, overseers of gangs and allow them extra compensation therefor.* The thought of some preferment of this kind, I fancy, would be a stimulus to students and make them more attentive to labor duties. Such supervision would require constant attention and oversight from those in charge; but this given must prove an advance method. Then the marking of the labor performed, by the person in charge, the same as a recitation, I believe will be found advantageous." We found this plan worked well on the farm in '82, but we were not authorized to pay extra compensation. At the May meeting of the Board of Agriculture this subject was presented for consideration, and after extended discussion, resolutions were adopted authorizing

1st. Extra compensation to Seniors for supervisory work;

2d. A labor record to be kept in which each student shall be marked daily as his work merits;

3d. Providing for a report (from the Superintendents to the Secretary) of the College of the student labor for each term.

The plan continues to work well. Students have, almost without exception, been diligent and attentive in discharging labor duties. I fully believe these changes will aid greatly in making our labor system more efficient. Experience and trial will indicate whether they will need to be modified or reinforced in certain particulars.

My faith in the system of student labor, which has been a distinctive feature of the Michigan State Agricultural College from its organization, is unabated. Our students believe in it. Our graduates come to feel its value in fashioning habit and sympathy in right directions more and more as they engage in the active work of life on the farm or elsewhere. Our patrons regard it as one of the main inducements that decides them to send their sons to this College. With the President of the College and the successive members of the State Board of Agriculture it has always been a cherished idea. Our legislators, however much they may object to other items in appropriation bills, never object to that which provides for payment of student labor. The Faculty generally approve. And so while we would not overlook or depreciate the difficulties that beset its practical management (and which have caused so many industrial Colleges to discard it), we would urge to united effort to give student labor the prominence it deserves in an Agricultural College course.

STOCK.

There have been no purchases of stock during the year except a very fine Merino ram from the flock of Hon. John T. Rich, of Lapeer. Flocks and herds have been in excellent health. The poorer specimens have been weeded out and our stock has made marked improvement. Our sales of stock amounts to \$2,600 for the time covered by this report. I append a table of weights of cattle and the summary of the milk record for '82 and '83.

Two of our farm teams will need to be replaced at no distant day. I renew a recommendation made in a former report "that it seems desirable to place a pair of Percheron mares on the farm."

CROPPING LIST, 1883.

Field.	Areas.	Crop.	Quantity.	Cost.	Rate per Acre.	Remarks.
No. 3	23.66	{ Wheat and } { experiments. }	260 bu.	\$82 15	\$6 18	{ 10 acres of No. 3 devoted to exper- iments. Egypt- ian wheat.
4	19	Pasture.				
5	20.50	Hay.	43.417 tons.	42 40	2 23	
6	27.64	Corn and roots.	{ 324.64 bu. corn. 832 bu. roots.	211 21	7 64	{ Only a part of the corn was husked.
7	17.11	Pasture.				
8	23.23	Corn.	255.3 bu.	165 43	7 12	{ Corn frosted; only part of it husked.
9	23.66	Hay.	53.339 tons.	50 62	2 14	
10	22.17	Oats.	1340 bu.	176 46	7 95	{ The cost embraces 70 loads of manure at 50 cts. per load. Clawson.
11	23.66	Wheat.	349 bu.	119 13	5 03	
12	22.	Pasture.				
13	23.	Pasture.				
14	10	Hay.	7.22 tons.	9 54	95	
15	14	Pasture.				

The season has in some respects been an unpropitious one for the husbandman. The excessive rains followed by drouth and early frosts have made the corn crop nearer a failure than ever before in the history of our State.

Grass was abundant but not of good quality. The table above gives the crops and yields for 1883.

SUMMARY OF MILK RECORD FOR YEAR ENDING JANUARY 1, 1884.

NAME.	Age.	Breed.	Date of Calving.	Weight of Milk for 1883. No. pounds.
Hermia 2d.....	6	Short-Horn.	Nov. 17th, 1883.	5,210 $\frac{1}{2}$
Heroine.....	7	" "	March 18th, 1883.	5,732 $\frac{1}{2}$
Heroine 2d.....	6	" "	March 23d, 1883.	5,551 $\frac{1}{2}$
Hela 3d.....	5	" "	March 25th, 1883.	5,318
Peri.....	6	" "	August 12th, 1883.	2,802
Phoenix 12th.....	6	" "	May 15th, 1883.	5,440 $\frac{1}{2}$
Lady Philly.....	5	Ayshire.	May 10th, 1883.	4,962
Lulu of Lansing.....	5	" "	August 29th, 1882.	3,445 $\frac{1}{2}$
Philetta.....	4	" "	October 20th, 1882.	4,438
Stewart Queen.....	6	" "	September 29th, 1882.	2,497 $\frac{1}{2}$
Stewart, Mary.....	12	" "	February 11th, 1883.	3,603 $\frac{1}{2}$
Stewart, Susie.....	9	" "	May 15th, 1883.	2,205 $\frac{1}{2}$
Idyl of Cedar Vale 2d.....	3	Jersey.	December 20th, 1882.	5,165 $\frac{1}{2}$
Jersey Queen.....	17	" "	April 1st, 1883.	4,733 $\frac{1}{2}$
Mae*.....	6	Holstein.	May 15th, 1883.	4,503

* Mae was away for breeding and we have no record for two and one-half months.

TABLE OF MONTHLY WEIGHINGS OF CATTLE ARRANGED BY BREEDS FOR 1882, 1883.

	When Calved.	October 26.	November 26.	December 26.	January 26.	February 26.	March 26.	April 26.	May 26.	June 26.	July 26.	August 26.	September 26.
SHORT HORNS.													
Colonel Acomb.....	1878	2018	1970	2040	2055	2050	2050	2055	2085	2045	2040	2030	1980
<i>Cows.</i>													
Heroine.....	1876	1225	1200	1300	1330	1372	1145	1125	1135	1130	1160	1120	1150
Heroine 2d.....	1877	1260	1250	1330	1330	1400	1235	1203	1190	1190	1200	1200	1280
Hela.....	1873	1422	1400	1460	1540	1552	1400	1286	1320	1345	1370	1360	1380
Peri Duchess.....	1877	1280	1270	1300	1340	1362	1375	1240	1136	1162	1170	1130	1170
Bonny Red Rose 2d.....	1874	1585	1550	1546	1600	1598	1344	1387	1360	1440	1500	1510	1410
Crystal Queen 9th.....	1876	1445	1430	1430	1460	1454	1556	1590	1602	1580	1565	1440	1370
Hermia 2d.....	1878	1454	1340	1250	1226	1120	1175	1200	1203	1225	1300	1390	1350
College Peri Duchess.....	1880	1225	1240	1270	1320	1350	1428	1380	1355	1385	1325	1130	1115
Handsome Hela 2d.....	1880	1210	1190	1240	1133	1065							
Victoria Duchess 4th.....	1875	1364	1340	1340	1400	1440	1450	1300	1300	1335	1350	1330	1320
College Red Rose.....	1881	977	1000	1060	1065	1100	1128	1127	1140	1125	1140	1120	1195
Heroine 4th.....	1881	863	860	920	994	1035	1060	1060	1050	1075	1110	1120	1180
Handsome Hela 3d.....	1881	674	660	700	720	797	830	890	884	883	910	950	1020
College Victoria Duchess.....	1881	730	730	810	860	900	924	955	948	964	1000	1020	1080
Hela 4th.....	1880	1200	1220	1220	1218	1222	1248	1244	1250	1295	1340	1410	1460
AYRSHIRES.													
Jacob of Linden.....	1880	1230	1230	1260	1266	1295	1278	1300	1320	1335	1340	1350	1310
<i>Cows.</i>													
Mary Stewart.....	1871	1044	1070	1100	1171	1050	1016	1010	940	990	1000	950	990
Susie Stewart.....	1874	984	1030	1040	1060	1100	1090	1094	944	937	940	950	910
Stewart Queen.....	1878	1054	1030	950	968	956	959	970	988	1010	1000	1000	950
Lady Philly.....	1878	980	970	990	978	1040	1050	1057	900	915	930	920	940
Lulu of Lansing.....	1878	970	950	940	912	910	965	1010	1064	1060	1060	1050	900
Philetta.....	1879	940	930	910	902	918	918	933	898	960	980	980	986
Ayrshire Steer Scott.....	1880	1050	1040	1070	1037	1100	1115	1147	1167	1135	1170	1120	1230
GALLOWAYS.													
Snow Flake.....	1877	1202	1170	1180	1224	1250	1285	1266	1300	1200	1100	1090	1195
" " 2d, Cross-bred, S. H. & G.....	1881	1000	1020	1070	1110	1144	1190	1175	1200	1200	1200	1180	1260
" " 3d, " ".....	1882	467	510	550	580	617	660	675	680	690	735	740	800
JERSEYS.													
Idyl of Cedar Vale.....	1871	984	1020	1040	1010	1020	1060	1060	1056	1062	1080	820	930
HEREFORDS.													
<i>Cow.</i>													
Lemon.....	1876	----	----	1475	1515	1512	1610	1580	1575	1620	1550	1490	1435
HOLSTEINS.													
<i>Cow.</i>													
Mae.....	1875	1227	1200	1230	1234	1285	1340	1385	1200	1100	1225	1250	----
DEVONS.													
<i>Steer.</i>													
Batavia 2d.....	1880	1025	990	1030	1040	1085	1070	1227	1120	1060	1090	1130	1115

NOTES ON POTATO EXPERIMENTS.

Ground for the experiments was mostly a sandy loam. There were a few places in the flats where clay was the prevailing soil. The ground had an ordinary dressing of manure, put on in the spring, before plowing. The ground was plowed at a good depth, harrowed thoroughly, and marked with a common two-horse marker into rows three feet apart, each way. The potatoes were cut into pieces having from two to three eyes; dropped in the rows, one piece in each hill, and covered to the depth of about four inches. The planting was done May 24th. After planting, the ground was rolled.

The potatoes came up very uniformly, with one exception, in Clark No. 1, which came up *three days* before the other varieties. The varieties were all up seventeen days from date of planting. The heavy rains injured those on the clay soil very much. The potatoes were cultivated three times during the season, with what is known as the double shovel cultivator or plow.

Paris green mixed with plaster was sprinkled upon the vines twice during the season. This kept the vines almost entirely free from the beetle. The extreme dry weather after so much rain early in the season, injured the growth of the crop.

All of the varieties were beyond the injurious effect of the frost, September 8th, except the Burbank Seedling, which were growing very nicely at this time. The drought did not affect this variety as badly as some of the others.

The potatoes were dug, commencing September 26th, and weighed; each variety separately; the results are seen in the table.

From careful estimates, and close observation, the Beauty of Hebron No. 2, or those from seed raised on the farm, seem to be a little ahead of the other varieties. Late Ohio are next, and this is a very desirable potatoe, from all appearances. It is not quite as smooth as the Beauty of Hebron, but is a very firm, fine growing, fair yielding potatoe.

The Dunmore next in importance, according to the result of the experiment. This is a *very handsome* potato. The skin and flesh are white, and when the potatoes were planted, the 24th of May, they were as firm and free from sprouts as when dug the fall before. This variety had a very vigorous growth, and the tubers are very compact in the hill. It is evident from the experiment that this variety is to be classed among the later varieties, although not as late as Burbank's Seedling. The potatoes are not as mature as some of the other varieties. There is a spongy feel to the tuber when pressed with the hand.

Clark No. 1, fourth in the list, is a promising variety, although it has one or two bad features this year. One is in being hollow, especially the larger specimens, another in being affected with a dry rot. This is not shown in either of the other varieties that were grown on exactly the same kind of soil. This variety is the most vigorous grower of any planted. It came up three days earlier than any other, but did not ripen sooner than the Early Ohio, or Beauty of Hebron.

EARLY OHIO.

This variety was damaged, to quite an extent, by the heavy rain storms during the forepart of the season. The wet weather might have affected its growth, and time of ripening; but notwithstanding its backwardness, it ripened ten days earlier than any other variety. The vines grew very rapidly and were strong and vigorous.

	Number hours' work.	Amount at 8 cts. per hour.
Cutting and planting.....	29	\$2 32
Putting on Paris green.....	25	2 00
Cultivating.....	23	1 84
Digging and sorting.....	116	9 28
Total.....	193	\$15 44

The work was all done by students, and as will be seen at a cost of about 5 cts. per bushel for all the labor employed. This does not include the cost of employing a horse for cultivation.

EXPERIMENTS TO DETERMINE THE VITALITY AND GROWTH OF WHEAT, CORN,
AND OATS, WHEN SOWED AT DIFFERENT DEPTHS.

The grains were sowed in rows six feet long and eighteen inches apart. Two feet of each row was devoted to oats, one foot to corn, and the remaining three feet to wheat. Twelve rows were sowed—the depth of soil covering the seeds in various rows varying from one-half inch in No. 1, to eight inches in No. 12. The experiment was not as accurate as could have been wished, owing to the heavy rains which occurred shortly after and during the time of planting, and washed the ground somewhat.

The results of the experiment are embodied in the following table:

No. of row.	Depth of cov- ering in inch's.	NO. OF SEEDS PLANTED.			Date of plant- ing	NO. OF SEEDS GERMINATING.			DATE OF APPEARANCE OF SPROUTS AT SURFACE OF GROUND.			PER C'T OF SEEDS GERMINATING.		
		Wheat.	Corn.	Oats.		Wheat.	Corn.	Oats.	Wheat.	Corn.	Oats.	Wheat.	Corn.	Oats.
1	$\frac{1}{2}$	50	10	40	June 4	45	10	37	June 7	June 7	June 7	90	100	92 $\frac{1}{2}$
2	1	50	10	40	4	41	9	31	7	9	9	82	90	77 $\frac{1}{2}$
3	1 $\frac{1}{2}$	50	10	40	4	41	9	25	8	9	9	82	90	62 $\frac{1}{2}$
4	2	50	10	40	4	25	7	24	9	10	9	50	70	60
5	2 $\frac{1}{4}$	50	10	40	4	24	7	27	9	11	9	48	70	65
6	2 $\frac{1}{2}$	50	10	40	4	30	10	31	9	11	9	60	100	77 $\frac{1}{2}$
7	3	50	10	40	5	31	5	30	10	13	11	62	50	75
8	3 $\frac{1}{2}$	50	10	40	5	22	8	27	11	13	11	44	80	67 $\frac{1}{2}$
9	4	50	10	40	5	22	9	18	12	13	12	44	90	45
10	5	50	10	40	7	9	9	13	-----	-----	-----	18	90	32 $\frac{1}{2}$
11	6	50	10	40	7	4	7	6	-----	-----	-----	8	70	15
12	8	50	10	40	7	0	8	0	-----	-----	-----	0	80	0

In closing this report I desire to express my obligations to those who have assisted me in the work of the department. The rapidly increasing value of our herds demands the unremitting attention of careful and considerate men who have learned the practical part of breeding and feeding stock. It is a field that gives ample scope for the exercise of no mean abilities and the most conscientious fidelity in the discharge of duties imposed.

To the State Board of Agriculture, whose members have evinced their deep interest in the department and who have cheerfully made such provision that I have been enabled to develop and strengthen it in various ways, I am under renewed obligations. All of which is respectfully submitted.

SAMUEL JOHNSON,

Prof. of Agriculture and Supt. of the Farm.

Agricultural College, Lansing, Mich., October 15, 1883.

REPORT OF THE PROFESSOR OF HORTICULTURE.

To the President of the Michigan State Agricultural College :

My work began on the first of January, 1883. The remainder of the winter was occupied in studying the wants of the department, its condition, and in laying out a plan of work for the ensuing season. The teamster was kept employed in drawing manure from the city, in cleaning paths about the grounds and in delivering wood for the various furnaces.

Mr. Cassidy, who had been since 1874 the efficient florist of the department, resigned his position and left about the middle of January to take a position in the Colorado Agricultural College. Mr. Louis Knapper, the former Superintendent of the department, was secured to take Mr. Cassidy's place. He has worked very hard, and has proved very efficient and skillful in his position. The grounds about the green house and the flower borders of the entire department have been very beautiful. A large part of the green house has been reglazed and painted, some of the benches lowered and otherwise changed and repaired, and the rosebed entirely reárranged and made new. The plants have all been repotted and are looking in good condition in all parts of the house, and promise abundant bloom for the coming winter. Quite a large number of new plants have been obtained, some from Germany and some from New York, Mr. Knapper making a trip to the latter city on purpose to make personal selection of varieties. About one-fourth of the entire labor of the department has been expended at the greenhouse and in the flower borders. The large water tank which was formerly poorly supplied by the windmill, has been connected with the new water-works and there will be no further lack of water in the summer season.

The excessive rains beginning in May and continuing until the last of July, have been a great hindrance to all outside work. For many weeks it was impossible to repair the walks and drives as fast as they were washed out of shape, and they still show the abundant need of repairs. I have found it impossible to obtain efficient help in team labor among the farmers of the vicinity, as I had been led to expect I might. The work has lagged on that account, the few days of pleasant weather not being sufficient to keep everything in order with the team labor of the department, and the farmers who have usually been obtained for extra work, finding the few pleasant days necessary for their own farm work.

On account of the breaking of the bridge across the Cedar river, above the college, the old gravel pit became inaccessible, and no gravel has been drawn for new drives. I have planned some changes under the direction of Mr. Oliver, our landscape gardener, and have opened a new gravel pit at the east end of the woods, upon the farm beyond No. 7, and from this we hope to get sufficient gravel to finish the new walks and drives already laid out, and to repair the damage done to those already finished.

The problem of good gravel for walks and drives is a serious one here, there being none within reach that is exactly suitable for the purpose. That which has been used becomes soft and sandy upon the surface in a short time, making the temptation to walk upon the grass too strong to be resisted by many.

The laying of the new sewer from the library and museum building, and the laying of the pipes for the water-works about all the buildings, has disfigured the lawns in some places, and it will take another season before they

can be thoroughly settled and reseeded. The lawns in front of the professors' houses, and that in front of Wells Hall and about the college building and greenhouse, have been kept mown once a week until the dry weather in September, and have looked in very good condition.

The location of the fountain, presented by the senior class, near the greenhouse, will necessitate some changes in the lawn and group of trees near by, and the trimming of trees, and opening of vistas, to give a view of the fountain from other parts of the grounds, which will be carried out early the coming season.

The grounds are kept in order by students, and with the great extent of lawn to maintain, and the drives and walks to keep in order, it makes a very heavy tax upon the department for labor. The balance against the department is owing largely to this work, and to various extra work in clearing up about the halls, drawing away rubbish left from making repairs about the buildings, and in putting on new roofs, etc.

The vegetable garden was continued in the same location as heretofore, and with the same general plan. Quite a large addition was made to the plantation of strawberries and raspberries. The west half of the southwest square was seeded to clover, for the purpose of green manuring. The excessive rains of the early part of the season, followed by the severe drouth of August and September, rendered many things of the garden an entire failure. This was true of the beans and squashes, the cucumbers and melons, and to a great extent, of the later planted corn and potatoes. The strawberries and raspberries produced a good crop. The blackberries and the black cap raspberries have been entirely destroyed by the yellow rust.

The apple orchard has done very poorly. I have watched it carefully during the season to discover its needs. The trees have made a very small growth, and many of them are suffering from the effects of the cold winters of a number of years ago—being more or less rotten, and some of them dying annually. The fruit has been small and scabby. The whole orchard needs plowing, pruning, and fertilizing thoroughly for a series of years, to bring it into good condition. Many of the trees are too old and feeble to ever be of any use. If there was any available ground upon the college farm, suitable for such a purpose, I should recommend the setting of a new apple orchard. It is certainly needed as a means of illustration.

The pear orchard has made a very fine growth, and there have been no signs of blight, or other disease. Some of the older trees are budded very full for blossoming next year. I fear the early frost may have injured some of the trees, as they were still quite green the 9th of September.

The Duke and Morello cherries and the plums are doing fairly well, although the birds help themselves liberally to the former, and the curculio does an abundant thinning of the latter. The Heart cherries are nearly an entire failure here.

The vineyard near the observatory has made a good growth, and is ready to bear a crop of fruit next year. The soil is exceedingly tenacious however, and in seasons like the present, it is impossible to make a good showing. The vineyard upon the terraces near Wells Hall has made an excellent growth, and is ready for a large crop of fruit next year. There was a fair crop of fruit in both vineyards the present season, but the killing frost of September 9th, destroyed the whole of it. I shall have both vineyards pruned and the vines laid down for the winter.

The arboretum and wild garden has been in charge of the Professor of botany and forestry.

I have been assisted in experimental work by Mr. James Troop. A full account of experiments tried and carried out is appended here.

CROSSING CUCURBITACEÆ.

This experiment was tried for the purpose of ascertaining which of the Cucurbitaceæ family can be cross-fertilized and how soon the effect will show.

I planted two hills of each of the following kinds of seeds: Long Green Cucumber, Summer Crook-Neck Squash, Boston Marrow and Hubbard Squash, Nutmeg and Cantelope Musk Mellon, Phinney's Early and Peerless Water Melon, and Pumpkin.

During early summer these promised good results, but the cold weather and excessive rains during the month of July seriously injured the vines, and heavy frosts on September 9th and 10th entirely ruined them.

CROSSING BEANS WITH FOREIGN STOCK.

Planted beans raised in the same locality for many years, with those of the same variety raised in different localities.

These were planted in drills about fifteen feet long. Three of these were mixed in the same row and two rows kept separate. These matured in spite of the early frosts, and the product will be planted again next year.

EFFECT OF DEEP OR SHALLOW CUTTING OF EYES IN POTATOES.

A plat of about two rods square was used for this experiment. The White Elephant and Early Ohio varieties were planted. The *deep* eyes were in each case cut to the centre of the potato, while the *shallow* eyes were cut one-fourth of an inch deep. These were planted in separate rows alternating throughout the plat, with two eyes in a hill in each case. Different tubers were used for the deep and shallow eyes. There was a marked difference in the size of the vines from the beginning until they reached maturity, the *deep eyes* being much the larger. The extremely wet weather during July injured them very much, so that the result was not what might have been expected. However, in every case, as will be seen by the following table, the rows with the deep eyes yielded the most and the largest potatoes. Beginning with *deep* eyes in the first row:

No. *White Elephant.*

- | | | |
|----|----------------|--------------------------------|
| 1. | $3\frac{3}{4}$ | pounds, medium size. |
| 2. | 1 | “ all small. |
| 3. | 3 | “ good size. |
| 4. | $\frac{1}{2}$ | “ all small. |
| 5. | $3\frac{3}{4}$ | “ medium size. |
| 6. | $1\frac{1}{2}$ | “ one-half of these fair size. |

Early Ohio.

- | | | |
|-----|-----------------|--------------------------|
| 7. | $11\frac{1}{2}$ | “ medium size. |
| 8. | $3\frac{3}{4}$ | “ one-quarter fair size. |
| 9. | $7\frac{1}{2}$ | “ good size. |
| 10. | 2 | “ one-half fair size. |

WHOLE POTATOES.

Along side of the “*deep and shallow eyes*” was planted one row of whole

potatoes, one in a hill, for the purpose of ascertaining whether the eyes on the lower side of the tuber will grow as well as those on the upper side. After twenty days these were dug up, and in every case only those "eyes" on the upper side, and about one-half the distance from the tip end of the tuber, grew. The others remained dormant. After breaking off these branches, some of the tubers were reversed and put back, while others were replaced with the *stem end up*. In every case the "eyes" that remained dormant before, all grew and produced potatoes; but they were all small.

DEEP AND SHALLOW EYES CUT FROM SAME TUBER.

In this experiment the "deep" and "shallow eyes" were cut from the same tuber, and in the same manner as those given above. The Early Rose potato was used for this, and the hills containing deep cut eyes alternating in the row with the shallow eyes. The number of tubers is given instead of the number of pounds:

Deep cut eyes. 5 tubers, medium.	Shallow cut eyes. 0 tubers.	Deep cut eyes. 6 tubers, medium.	Shallow cut eyes. 0 tubers.
0 " large.	3 " small.	3 " small.	2 " small.
6 " large.	2 " "	5 " medium.	3 " "
4 " medium.	0 " "	1 " "	0 " "
8 " "	2 " small.	6 " "	0 " "
8 " "	1 " "	7 " "	2 " "
3 " "	2 " "	3 " "	0 " "
6 " "	3 " "	10 " "	2 " medi'm.
8 " large.	6 " 3 small, 3 med.	6 " large.	1 " small.
6 " "	2 " "	5 " "	2 " medi'm.
56 for deep eyes.	21 for shallow eyes.	52 for deep eyes.	12 for shall'w eyes.

CORN MIXED WITH SMUT.

A plat of four square rods was planted to corn with the seed of every alternate row soaked in a solution of corn *smut* before planting, and beside this smut was placed in the hill with the kernels. The purpose of this experiment was to show whether corn treated in this way would be any more liable to be affected by this fungus than that which was perfectly clean when planted. Observations taken at different periods throughout the season showed no perceptible difference between the rows treated with smut and those without it. A heavy frost on September 9th killed the whole of it.

IMPROVED DENT CORN.

For the past three years Professor Beal has been improving Dent corn by selecting the most promising stalks and cross-fertilizing the ears with pollen from other good, promising stalks, then selecting ears for seed from those stalks which bore two good ears. The attempt was made to carry this still further this year, but this, as well as all the other experiments, suffered from the effects of the extreme wet and cold weather, and the early frost. It was observed, however, that an unusual number of the stalks would have produced two or more ears, had the conditions proved favorable for ripening.

HUCKLEBERRIES.

The different varieties of huckleberry seeds which were placed in the greenhouse on August 20th, for some reason, all failed to germinate.

VARIATION OF CROPS UNDER SIMILAR CONDITIONS IN ADJOINING ROWS.

This is a continuation of an experiment begun two years ago, to note the amount of variation in different rows which have been treated alike in every respect, as far as regards fertilizers and cultivation. For this purpose six rows of onions were chosen from the field, each row being carefully pulled and measured by itself. The following is the result:

Row No. 1	contained	$2\frac{1}{4}$	bushels.
" 2	"	$2\frac{1}{2}$	"
" 3	"	$2\frac{1}{2}$	"
" 4	"	$2\frac{3}{4}$	"
" 5	"	3	"
" 6	"	2	"

During one-half the summer term I taught the senior class in landscape gardening. The class numbered twenty-six. The instruction was given by means of lectures, hastily prepared, and not very valuable to the class. The work, however, was very beneficial to myself and appeared to be profitable and interesting to the students.

During the autumn term I have given instruction to the junior class in horticulture. The class numbered twenty-eight. The instruction was given by means of lectures, except a short course in market gardening, in which "Money in the Garden," by P. T. Quinn, was used. This was not as satisfactory as lectures, and will not be used again. A series of out-door lectures connected with practical work in the orchards and vineyards has been given which was apparently very satisfactory to the students. This will be continued during the spring and summer term of the present year.

The labor of the students has been fairly satisfactory. An attempt has been made to mark the students in proportion to their skill, dexterity, and strength in labor, but when these have been taken into account and wages reduced accordingly there has been much dissatisfaction expressed, and I have allowed faithfulness at work and interest manifested in the work to have a greater influence in the marking than skill and ability. I find it easier to judge of a man's fidelity and interest than to judge of his comparative ability, and more satisfactory to all concerned.

During the present term seniors have been put in charge of gangs of students, and allowed extra compensation for their work at wages as high as $12\frac{1}{2}$ cents per hour. They have taken much interest in their work and the plan has been eminently satisfactory.

My foreman, Mr. E. D. Millis, has managed the work entrusted to him well in every respect. His firmness and uniform courtesy has won the respect of all. Although a recent graduate and with little practical experience in horticultural matters he has taken hold of the work in earnest, and is showing energy and capacity that will bring success. During the year I have had charge of the janitor work of the two dormitory halls, and nominally of the repairs. The latter has not been satisfactory, and I hope I may be relieved of it all, both repairs and janitor work, at as early a date as may seem best to yourself.

I am very grateful for the kind assistance I have received from each member of the faculty, and for the cordial coöperation of all in the beginning of my work. It has not been an easy matter for me to grasp all the details of management of the entire department, and bring them into harmonious working order at once. I have gained a knowledge of the needs of the department, however, and feel confident that I shall be able to make it a greater credit to the college and of greater value to the horticulturists of the State.

Respectfully submitted,

JAMES SATTERLEE,

Professor of Horticulture.

REPORT OF DEPARTMENT OF CHEMISTRY.

To President Abbot :

The college year just closed has been one of continued prosperity in the chemical department. The class work has been uninterrupted, and full of enthusiasm. The class-room instruction and work have been of the same kind and amount as in my last report, and need no recapitulation at this time. It has fully occupied the time of myself and my assistant.

COMPLETION OF CHEMICAL LABORATORY.

My time and attention have been much taken up with the oversight and superintendence of the completion of the chemical laboratory. All the new part (except one room) has been completed in a most satisfactory manner, furnishing good accommodations for students in advanced chemistry. There are two airy and well-lighted analytical rooms, furnished with gas and water, a balance room, desiccating closet, combustion furnace and fixtures for organic analysis, two large glass cases for apparatus, and two convenient store-rooms. The rooms are finished in natural wood and are models of neatness and convenience.

These rooms are designed for work in advanced chemistry, quantitative analysis, and original investigations. They afford excellent opportunities for students in the senior year, and for post-graduate study.

The chemical laboratory now offers accommodations to students, as follows : In elementary chemistry for 150 students; in blow-pipe analysis, volumetric analysis for 68 students; in qualitative chemical analysis for 68 students; in chemical physics and meteorology for 150 students; in advanced chemistry, original research, and post-graduate study for 20 students.

METEOROLOGY.

The tri-daily observations of the weather have been maintained through the year. These observations now cover a period of more than twenty years, and are the completest meteorological records in the State.

In addition to taking observations, I have endeavored to secure the establishment of a *State Weather Service*, to act with the United States Signal Service, in giving warnings of impending dangers from storms and frosts, and thus afford the farmer, the fruit grower, and stock raiser the same kind of protection that the general government has extended to commerce. In my estimation, the producer has the right, and should demand the same

kind of assistance that is now given to the carrier. The value of production must always exceed that of commerce, and will receive protection corresponding to its value when producers firmly and meaningly demand their rights.

I hope to live to see a State weather service established at this college, to collect and diffuse information respecting the relations of meteorology to agriculture, and especially to give warning of coming dangers which threaten the producing class from changes in the weather. The college should be made the center of scientific information relating to soil production, in its widest sense.

PUBLIC HEALTH.

Although it is more than three years since I declined a reappointment as a member of the State Board of Health, it is difficult to convince the public that I am no longer a member of that board. I still receive numerous communications relating to matters that come properly before the State Board of Health. I still feel that the public health is as important a subject to farmers as any class of our citizens. Health is a prime condition of production. Not only is the farmer interested in this question as a producer, but the markets of the country are disturbed by sickness. Exchange of produce is thrown into wild disorder by an outbreak of yellow fever or cholera. In mere dollars and cents the farmer is interested in the public health, to say nothing of saving life and averting woe. The epidemic of yellow fever in the Mississippi valley, in 1879, cost the people of the United States \$175,000,000. This enormous loss did not fall solely upon the communities where the yellow destroyer scattered graves thick as snow flakes, but in its final adjustment this loss reached the pocket of every producer in our land. In commerce as in pathology, "If one member suffers all the other members suffer with it."

I have therefore thought that it was not out of place even for a professor in an agricultural college to take an interest in the public health. In this spirit I have taken a lively interest in all efforts to preserve the public health. As president of the American Public Health Association, I attended the meeting of the executive committee in St. Paul, and the annual meeting in Indianapolis. I also attended the annual meeting of the Sanitary Council of the Mississippi Valley, last April. These journeys cost time and money, for which I received no compensation that does not equally fall to the lot of every citizen in safety of life and security of property.

In promoting health in this State, I gave a lecture before the sanitary convention in Pontiac, on well water, and means of preserving it.

FARMERS' INSTITUTES.

I attended the institute at Armada, and had a paper read at the institute at Galesburg, but was prevented from attendance by reason of being a witness in an important trial.

SORGHUM.

I still have great confidence in the future of sorghum in Michigan. Last December I attended a meeting of the Sugar Cane Growers' Association of St. Louis, where I found much to encourage the cultivation of sorghum not only for syrup but for sugar.

Being convinced that sorghum was of great value as a forage crop, especially on sandy soils, I spent most of my spring vacation in visiting the sandy central belt of our State, calling public attention to this plant as a valuable food for stock. I wrote for the press several articles on the subject which have been

copied in public papers all over the country. I also sent trial packages of seed to all who applied. The untimely frost in September prevented any test of the uses of sorghum for this purpose.

ADDRESS AT COUNTY FAIR.

By invitation, I gave the address at the Midland county fair at Midland City; subject, Farmers' Rights.

CORRESPONDENCE.

I have had an extensive and varied correspondence, and might fill many pages with the questions and answers if I supposed the public would be interested or profited thereby.

SPECIAL INVESTIGATION IN NITROGEN.

The source of nitrogen in plants has been a subject which has occupied my thoughts and experimental investigation. The researches on this subject were interrupted by work in completing the laboratory, and work on this subject had to be thrown aside for this year. It will be resumed next year with better facilities. It is a subject which occupies the time and thought of agricultural chemists in all countries.

Respectfully submitted,

R. C. KEDZIE,

Professor of Chemistry.

December, 1883.

REPORT OF THE ZOOLOGICAL DEPARTMENT.*To the President:*

I herewith submit my report for the past year:

During the first half of the autumn term I gave a course of lectures in Zoölogy to the senior class, which numbered thirty members. The subject was very fully illustrated by use of living animals, preserved specimens from the museum, and histological preparations, of which I have now of my own preparation a very complete suite. The same class, during the remainder of the term, pursued under my instruction the science of geology. I lectured to them daily, and also used Dana's text-book. The usual trip to Grand Ledge—the nearest outcrop of rocks—was enjoyed and appreciated by the members of the class. During the last half of the term I also gave to the junior class a course of lectures in comparative anatomy. The class numbered thirty-six. Besides the lectures, an hour was spent each day in laboratory work. On these occasions the class was taken in sections of six to eight each. Each student was required to examine parts minutely, and to carefully compare parts of lower animals with the corresponding portions of the human body. Extensive use was made of the excellent means for illustration now in our possession. In this term I lecture one hour daily for the first half, and two hours each day the second half. I also gave one hour each day to laboratory instruction during the second half term.

In the spring term I lectured daily to the junior class on the subject of human and comparative physiology. The class numbered thirty-two. In

connection with this study I gave three hours daily to laboratory practice. Each two students dissected a cat. Each portion was compared by the student to the models of the same part in the manikin. Comparison was also made with similar parts in other animals, which were either dissected at the time or procured in the museum. Many of the students dissected other animals, and worked at other than required times. In several cases the students worked up some animal or organ carefully, and gave the results of their investigations to the Natural History Society.

The summer term was spent with the same class, entomology being the study pursued. Besides the daily lecture, one hour was given to laboratory practice each day. All the students made fine collections of insects, which in several cases were shown at the county fairs, and, in more than one case, donated either to a farmers' club or grange. Each student reared insects right in his own room, in breeding cases, so as to be the better able to observe and study their habits. During this course, instruction was given in the apiary. All the students went through all the manipulations necessary in practical bee-keeping.

In the spring term I spend four hours daily with the students: One in lecture and three in laboratory work; and in the summer term one hour in lecturing, and from one to two in the laboratory and at the apiary.

SUGGESTIONS.

As we now have our course so arranged that the study of microscopy and free hand drawing precede the studies taught by me, the students are able to do much better work. It only remains to give to zoölogy and geology each a full term, when the course in my department will be quite satisfactory. The students are unanimous in the desire for this last change, and with the present arrangement for making the studies of the senior year elective, there seems no obstacle in the way of a full term in zoölogy, and only lack of teaching force to prevent the same in geology.

COLLEGE WORK ASIDE FROM INSTRUCTION.

During the year I have given one general lecture before the students; subject: The Ear. I also, by special request, lectured before the students upon physiological laws and preservation of the health.

I have arranged and hung up in my class room about thirty additional cases of insects. The museum affords opportunity for infinite work, and takes the little spare time which I snatch from my other duties. The past season we have added many new specimens, the most interesting of which are a selection of Ward's casts.

The apiary also takes much of my time and energy. Frequently the student in charge is called away, perhaps right in the very busiest season, when all the labor devolves upon me. This is frequently very severe and arduous. I have conducted the Bible lesson in the Sabbath-school on several occasions.

EXPERIMENTS.

During the present season I have, in connection with my students, tried a large number of experiments in reference to the value of different insecticides. I have taken special pains to test kerosene oil, pyrethum, and the arsenites. The results of these experiments will be given in my lectures in the forthcoming farmers' institutes and will therefore appear later in the reports of the

State Board of Agriculture. The daily weighing of a colony of bees has been continued the present season. I think these weights, with the peculiarities of the weather, would be good material for the report. Such data are often very valuable, and frequently lead to important discoveries.

THE APIARY.

The winter of 1882-83 was a very severe one with bees. While many bees throughout the country died all of ours put in the cellar came out in fine condition, except one, which, from an accident, died of starvation. One other in whose hive much pollen was placed the preceding autumn, had dysentery, and was quite weak in bees. This one was found queenless, and was early united with others. The cellar maintained a temperature of about 40° F. The bees were in the cellar 142 days. The amount of honey consumed by the bees wintered in the cellar was an average of $4\frac{1}{2}$ lbs. The greatest amount consumed by any one colony was 6 lbs. Four colonies were wintered outdoors in chaff hives. One of these died. The other three were weak. The average consumption in these colonies was $14\frac{1}{2}$ lbs.

We had no spring dwindling, but found we had three drone-laying queens, a thing new in our experience. This reduced our colonies to eleven in the early season. The season has been below the average, though on the whole a pretty good one.

We have secured about 80 lbs of honey to the colony, about one-eighth of which was comb honey. We only tried to secure comb honey from four colonies. The quality of the comb honey from the Syrian bees is excellent, and we find the bees easily managed and very excellent in quality.

I still think, as I suggested last year, that to make the apiary larger and place it in charge of a competent assistant, it might be made more than self-supporting, would have added usefulness as an educating feature of the college, and would greatly relieve me, as now not infrequently the entire care of the bees often devolves upon me, and that in the very busiest season of the year.

PROGRESS IN THE DEPARTMENT.

During the past season we have secured a series of Ward's casts and other specimens for the museum. A large collection of insects is suspended on the walls of the class room. Both of these features are valuable aids, and help to make the course more profitable to the students. We still need specimens in the museum. One of the next additions should be a faunal collection of birds. Some families of birds are hardly represented at all.

OUTSIDE WORK.

During the past year I attended the annual meeting of the American Bee Keepers' Society at Cincinnati. As president of the association I gave an address on the so-called "dry feces" of bees.

During the winter I attended two farmers' institutes, one at Jeddo, the other at Galesburg, at each of which I lectured twice, once on Physiology and once on Economic Entomology.

I have attended and lectured before two meetings of the State Horticultural Society, one at Flint, the other at Ionia. I have also attended, as President, the annual meeting of the State Bee Keepers' Association at Kalamazoo, before which I gave a paper. I have also attended and taken part in the two meetings of the Central Michigan Bee Keepers' Association.

During the summer I was requested to visit Hillsdale by the Mayor and Common Council of that city to investigate the shade trees in that city, many of which were diseased or dying. I made the examination, and found the cause of the trouble to be the leaking mains to the gas pipes. I made a report, which was published in all the Hillsdale papers.

During the past winter I entirely revised and rewrote my Bee Keeper's Guide. This tenth thousand was issued May 3d. September 3d the entire edition had been sold.

My correspondence has become immense. Some single days the past summer I have had as many as fifteen letters. These are mostly in reference to practical or scientific matters connected with insects or bees. I have never failed to give all such inquiries the earliest possible attention. To answer such letters often requires hours of study and labor.

Respectfully submitted,
A. J. COOK.

REPORT OF THE PROFESSOR OF BOTANY AND FORESTRY.

To the President :

I herewith present a brief report for the year closing September 30th, 1883.

BOTANY.

During the autumn term of 1882, for the first half of the time, forty-eight sophomores, in two sections, took the course of systematic botany, paying especial attention to some of the leading natural orders which are of economic value. During the last half of the spring term the seniors, twenty-eight in number, pursued the study of physiological botany, for two hours daily. Each student was supplied with a compound microscope, costing from thirty-five to eighty dollars. Lectures were given once a week. Hereafter a whole term, with daily practice, will be given to physiological botany.

The freshmen, during the last term of the year—the summer term—began botany in two sections, with daily work. There were fifty names on the roll.

Throughout the year there have been at all times from one to five students taking some advanced work in botany.

I have frequently met a few students by themselves, to help them over studies in which they had failed, or to help them over subjects which were studied by the class during their absence from sickness or other cause, or to help special students who could not take the study with the class.

HORTICULTURE.

I gave a course of lectures daily, to the members of the junior class, during the autumn term. There were forty names on the roll.

LANDSCAPE GARDENING.

During the last half of the summer term, daily lectures were given to the sophomores, fifty-one in number.

FARMERS' INSTITUTES.

I attended and took part in institutes held by the State Board of Agriculture in Farmington and Jeddo.

QUESTIONS ASKED.

The number of questions has increased during the past year. These have all received prompt replies. A glance at those asked the Professor of botany will show that he has done considerable work which properly belongs to an experiment station.

It is not at all uncommon to receive ten letters a day, and sometimes fifteen letters, and some cards have been received. These inquiries have come from all parts of the United States, some from Canada, and a few from Europe. To save room, I omit the names of the States, and for other reasons, omit the names of the persons asking questions: "I wish to be instructed in the scientific method of hybridizing portulacca." "What handling is necessary in order to procure seed of asters that will be sure to produce double flowers?" "Are you acquainted with Henderson's Hand-Book of Plants, and is it desirable?" "Where can I obtain some cotton-wood tree seeds, or young trees?" A president of an agricultural college wants to know "if there are parties who take the job of constructing greenhouses?" "Will you give me the names of some reliable firms that I may correspond with?" "Do such firms put up iron frame houses?" "Would you advise a curvilinear roof, or square roof?" "How many barrels of salt will be required to kill quack-grass on an acre of ground?" "Should it be put on all at once, or at different times?" "Can it be killed by cultivation?" "Will you give me an account of the labor system at your agricultural college, and also of your course in horticulture?" This was asked by a Professor of horticulture. "What, in your opinion, are the best methods to pursue in order to overcome the prejudices existing among the farmers of the south, with reference to the education of their children?" "What is the mailing price of the report of the Michigan State Board of Agriculture?" "Can you give remedies to keep apple trees from splitting and dying?" "Is the 'tare' *vicia sativa*, adapted for soiling purposes?" "What is the name of the enclosed grass?" (oat-grass). "Is it foreign or native?" "Will you kindly give the name of the enclosed buckwheat shaped seed, if possible? We are unable to determine it?" A Professor in an agricultural college asks: "Would it be better, in building a cheap greenhouse, to employ a firm that makes that kind of work a specialty, or ordinary mechanics?" "Are there any grasses that will do better than June grass and Orchard grass for grazing purposes, on land in southeastern Missouri?" "There is something the matter with my peach trees (the leaves)." "Is it what is called the *curled leaf*?" "Has it any relations to the Yellows?" "What will be the final outcome of the disease, and is there any remedy?" "Where can I find any literature on the subject?" "I send you the enclosed plant (*tradescantia virginica*), for name." "Can you give remedy for red rust on blackberry? also for small steel beetles on grapes? also rose chaffers?" "Please send name of the enclosed grass, (*phalaris arundinacea*). "Please give name of the two enclosed grasses." "What is the difference between June grass and Kentucky Blue grass?" "What is the name of the enclosed grass (*hordeum jubatum*), and is it likely to become a pest like the quack grass?" "Please name the enclosed plant, (*ænothera biennis*), and state whether it would be a desirable plant for ornamenting public grounds?" "The director of an experiment station asks: "What do you think of the propriety of giving two botanical names to well marked races of agricultural plants?" "Please name the enclosed grass, (*quack-grass*). It is becoming a great pest." "What is the

name of the enclosed thistle? It is very troublesome.' "The enclosed leaves are supposed to be smeared with blood; will you give us your opinion on the subject?" They were affected with a fungus growth. "What is the named of the enclosed plant? (*silene*). It is a new, troublesome weed in wheat." "What is the cause of wheat blight?"

A Professor of agriculture asks: "Does timothy blossom twice?" "Please give name of enclosed plant," (*ambrosia*). "Where can seed of Blue-joint grass (*calamagrostis Canadensis*), be obtained?" "What ails my plum leaves?" "What success do you have with Paris green in killing the apple worm, and curculio?" "Can you tell me what ails my celery, and give remedy? Brown spots appear when set out." "Please name a few varieties of plums for Michigan." "Why were peach trees, that were protected by snow drifts, killed during the past winter, while those standing in cold, bleak places were not?" "How much salt to the acre, on clay land, is required to kill worms, and what kind of salt is best?" "Please send me the name of some reliable grocer or commission merchant in Lansing, who would like to handle potatoes." "Can choice seed of water melon originate plants the fruit of which may be spoiled by pollen of citron in an adjoining bed; also, will cucumbers and gourds mix?" "Please give name of the enclosed flowers, which came from Colorado." "Please give the name of the enclosed leaves," (mulberry). "I send you roots and stubble of a stool of wheat that was found in a forty-acre field of Fultz wheat. Would like to know what kind it is."

The commissioner of immigration requests the following: "Please to send me the names of the species of maples, ashes, cherries, elms, hickories, oaks, and birches given in your report of the flora of Michigan, published in 'Michigan and its Resources.'" "Where is red cedar found?" "Will you please answer the following questions in regard to a peach orchard: "Will peaches be likely to succeed on a light, sandy hill, sloping to the west, with woods on north and south sides?" "Which varieties are best for a succession of fruit?" "Can you give me the names of two or three reliable nurserymen whose trees have not been troubled with yellows?" "Are the Rochester nurserymen, and the firm of J. S. Collins, of New Jersey, reliable?" How far apart should peach trees be planted?" "Shall I buy one-year-old trees?" "Please send name of the enclosed plant," (*xanthium spinosum*). "Do you know of any varieties of fruit (grapes excepted), whose exact parentage is known?" "Do you know of any different results having been obtained by systematic crosses, or are most of our varieties accidental, or supposed crosses?" "Can results of any cross be predicted with any degree of certainty?" "Which do you consider the best for bees, *reseda odorata*, *reseda odorata grandiflora*, *ameliorata*, Parson's new white, and new hybrid spiral?" "Can mignonette be sown in drills in the fall?; how much should be sown to an acre? How wide apart should the rows be? How wide apart in the drill? How often should mignonette be sown? Will it, after sown, remain permanently?"

Questions were asked about alfalfa, about panicum crass-galli. A member of the department of agriculture asks for information concerning a fungus, (*actomyces*). A prominent politician sends a specimen of spurred wheat, and wants to know what it is, the cause, etc. The master of the State Grange asks questions about our agricultural college, and the teaching of agriculture in the common schools. The secretary of the American Holstein Association asks for an address for the meeting at the Grand Pacific Hotel, Chicago, Illinois.

PUBLIC LECTURES.

Two invitations to give addresses in the open air, at county fairs were refused.

By invitation of the lecture bureau of the Patrons of Husbandry, I gave a lecture in this State at Macon, Madison, Palmyra, Lansing, and should have given one at Otsego, were it not for inclement weather. I gave several lectures in Illinois, Indiana, and Ohio. I lectured at Ionia, at a meeting of the Teachers' Association of Ionia and Montcalm counties.

ILLINOIS HORTICULTURAL SOCIETY.

By invitation I gave an address to the winter meeting of this society held in Kankakee.

THE STATE AGRICULTURAL AND THE STATE HORTICULTURAL SOCIETIES OF WISCONSIN.

I gave an address at a union meeting of these two societies, held in the State capitol. The Legislature was in session. One object in inviting me to speak was to learn about our agricultural college.

VISITING COLLEGES.

During the winter vacation, I visited four agricultural colleges; those at Champaign, Illinois; Lafayette, Indiana; Columbus, Ohio; Madison, Wisconsin.

OUR STATE HORTICULTURAL SOCIETY.

I gave a lecture on "the Structure and Growth of a Tree," at the winter meeting held in Flint. I also read a paper at the meeting held in Hudson. The last report contains four or five other papers prepared by myself. I read a paper at the Ionia meeting.

THE STATE TEACHERS' ASSOCIATION.

I performed considerable work in preparing for the annual meeting held during the holidays, in Representative hall, of our capitol. I exhibited some work of my botanical students, and took about a dozen compound microscopes to an evening entertainment. I read a short address as president of the society.

THE AMERICAN POMOLOGICAL SOCIETY.

I attended the biennial session of this society held in Philadelphia, and was re-elected secretary, which position I accepted very reluctantly. The next meeting will be held in Michigan.

In filling the office of secretary, it is my duty to edit, during the winter vacation, a quarto volume of about two hundred and thirty pages, as the proceedings of the society.

Governor Begole appointed me to represent the State at the Louisville exposition, but I was obliged to decline the honor, on account of work at the college during the autumn term.

THE SOCIETY FOR THE PROMOTION OF AGRICULTURAL SCIENCE.

I attended during the summer vacation, the annual meeting held at Minneapolis, Minnesota, and presented some notes on grasses. In the absence of the president, I acted in that capacity during the meeting. No other member of our faculty attended.

Early in the year I edited the proceedings of the three former meetings, in one volume.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

I attended the annual meeting of this national association, held in August, at Minneapolis.

As chairman of the section of biology, I read an address. The subjects usually chosen for such addresses, are something pertaining to the progress of some department of biology, such as botany, zoölogy, physiology, entomology. In consideration of my connection with an agricultural college, I selected as my subject, "The needs and opportunities of agriculture." The address has been widely copied, and highly spoken of by the agricultural papers of our country.

CORRESPONDENCE UNIVERSITY.

This is a new institution composed of some thirty-five or more professors, in this country and in Europe, and is intended to give instruction by correspondence. I declined to accept the professorship of pomology and horticulture, which was offered me, but finally accepted a place, agreeing to give instruction on "grasses and clovers."

TESTING SEEDS.

The following tables will bear studying. They are submitted without comment:

Hiram Sibley & Co.

Seeds in small papers bought in Lansing.

Variety of Seed.	Mode of Testing.	Temperature.	Seeds Tested.	Percent Germinated.
Radish, Early Long Scarlet Short top.....	Damp paper on moist sand.	60°—70°	100	70
Radish, Early Scarlet Turnip..		60—70	100	31
Lettuce, Large Drumhead.....		60—70	100	63
Cress, Fine Curled.....		60—70	100	57
Turnip, Golden Ball.....		60—70	100	100
Kohlrabi, Early Sm'th Purple..		60—70	100	50
Cabbage, Early York.....		60—70	100	29
Onion, Yellow Dutch.....		60—70	100	34
Chicory, Large Rooted.....		60—70	100	37
Brocoli, Carter's Summer.....		60—70	100	20
Tomato, Gen. Grant.....		60—70	100	47
Beet, Long Dark Blood.....		60—70	100	90
Brussels Sprouts.....		60—70	100	14
Onions, Red Weathersfield.....		60—75	300	90
" " " " " "	Porous Saucers.....	60—75	200	90

Second lot from the same source.

Radish, Early Long Scarlet Short Top.....	Damp paper on moist send.	60°—70°	100	47
Radish, Early Scarlet Turnip..		60—70	100	34
Lettuce, Large Drumhead.....		60—70	100	71
Kohlrabi, Early Sm'th Purple..		60—70	100	41
Cress, Fine curled.....		60—70	100	70
Carrot, Half Long.....		60—70	100	32
Brocoli, Carter's Summer.....		60—70	100	14
Onion, Yellow Dutch.....		60—70	100	33
Ruta Baga, Purple Top.....		60—70	100	00

Hiram Sibley & Co.

Seeds bought in bulk at groceries in Lansing.

Variety of Seeds.	Mode of testing.	Temperature	Seeds tested.	Percent Germinated.
Cabbage, Early Winningstadt	Damp paper on moist sand.	62°—70°	100	57
“ Red Pickling	“ “	62—70	100	47
Onion, Red Weathersfield	“ “	60—75	200	98
“ Yellow Dutch	“ “	60—75	200	29
Bean, Lima	Porous plates	70—85	25	100
Cabbage, Early Winningstadt	“ “	70—85	100	92
“ Red Pickling	“ “	70—85	100	75
“ Fotler's Improved	“ “	75—45	100	94

Seeds raised at Michigan Agricultural College.

Onions, Red Weathersfield	Damp paper on moist sand.	60—75	700	99 $\frac{3}{4}$
Lettuce	“ “	60—75	500	99 $\frac{3}{4}$
Timothy seed from Illinois	Porous plates	70—85	200	99

Crossman Brothers.

Seeds bought at groceries in Lansing.

Variety of Seed.	Mode of Testing,	Temperature.	Seeds Tested.	Percent Germinated.
Lettuce, Simpson's Early Curl'd	Damp paper on moist sand.	60°—72°	100	60
Radish, Long Scarlet Short T'p	“ “	60—72	100	56
Salsify	“ “	60—72	100	89
Carrot, Improved Long Orange	“ “	60—72	100	39
Turnip, Purple Top Strap Leaf	“ “	60—72	100	100
Cabbage, Large Early York	“ “	60—72	100	86
Leek, Musselburgh	“ “	60—72	100	87
Onion, Red Weathersfield	“ “	60—72	100	91
“ “	“ “	60—75	200	94

W. E. West of North Lansing.

Seeds bought directly of grower.

Variety of Seed.	Mode of Testing.	Temperature.	Seeds Tested	Percent Germinated.
Carrot, Short Horn	Damp paper on moist sand.	62°—70°	100	62
Lettuce—crop of '82	“ “	62—70	100	100
Beet, Turnip	“ “	62—70	100	75
Turnip, Flat	“ “	62—70	100	100
Spinach	“ “	62—70	100	45
Lettuce—crop of '80	“ “	62—70	100	96
Radish, Winter	“ “	62—70	100	100
Spinach	“ “	62—70	100	75

D. M. Ferry & Co. (No. 1.)

Seeds bought at groceries in Lansing.

Variety of Seed.	Mode of Testing.	Temperature	Seeds Tested.	Percent Germinated.
Radish, Early Rose.....	Damp paper on moist sand.	60°—70°	100	75
Cabbage, Early Winnigstadt.....	" " "	60—70	100	68
Spinach, Round Summer.....	" " "	60—70	100	39
Tomato, Trophy.....	" " "	60—70	100	73
Lettuce, Simpson's Early.....	" " "	60—70	100	68
Onion, Yellow Danvers.....	" " "	60—70	100	64
Leek, London Flag.....	" " "	60—70	100	87
Beet, Improved Early Blood.....	" " "	60—70	100	65
Turnip, White Globe.....	" " "	60—70	100	100
Endive, Green Curled.....	" " "	60—70	100	47
Cress, Curled.....	" " "	60—70	100	65
Cauliflower, Early Paris.....	" " "	60—70	100	38
Sage, Broad Leaf.....	" " "	60—70	100	30
Egg Plant, Improv'd Large Leaf.....	" " "	60—70	100	34
Carrot, Long Orange.....	" " "	60—70	100	48
Kale, Green Curled.....	" " "	60—70	100	24
Salsify.....	" " "	60—70	100	32

Gale of Corunna, Mich.

Seeds bought at groceries in Lansing.

Variety of Seed.	Mode of Testing.	Temperature	Seeds Tested.	Percent Germinated.
Onion, Yellow Danvers.....	Porous plates.....	60° to 75°	200	37
" ".....	Damp paper on moist sand	60° to 75°	300	47
" ".....	" " "	60° to 75°	100	47
" ".....	" " "	60° to 75°	100	50

(No. 2.) D. M. Ferry & Co., same as No. 1.

Seeds bought at groceries in Lansing.

Variety of Seed.	Mode of Testing.	Temperature	Seeds Tested.	Percent Germinated.
Radish, Early Rose.....	Damp paper on moist sand	60°—72°	100	82
Cabbage, Early Winnigstadt.....	" " "	60—72	100	64
Spinach, Round Summer.....	" " "	60—72	100	33
Lettuce, Simpson's Early.....	" " "	60—72	100	65
Onion, Yellow Danvers.....	" " "	60—72	100	59
Leek, London Flag.....	" " "	60—72	100	44
Beet, Improved Early Blood.....	" " "	60—72	100	58
Turnip, White Globe.....	" " "	60—72	100	99
Endive, Green Curled.....	" " "	60—72	100	57
Cress, Curled.....	" " "	60—72	100	64
Carrot, Long Orange.....	" " "	60—72	100	36
Kale, Green Curled.....	" " "	60—72	100	30
Salsify.....	" " "	60—72	100	60
Nasturtium.....	" " "	60—72	33	66

D. M. Ferry & Co.

Seeds bought in bulk at groceries in Lansing.

Variety of Seed.	Mode of Testing.	Temperature	Seeds Tested.	Percent Germinated.
Muskmelon, Skillman's fine net'd	In porous plates	70°—85°	100	91
" Fine green Nutmeg	" " "	70—85	100	100
" Long " "	" " "	70—85	100	99
Watermelon, Peerless.....	" " "	70—85	100	94
" Black Spanish.....	" " "	70—85	100	100
Bean, German Wax.....	" " "	70—85	50	100
" Golden Wax.....	" " "	70—85	50	100
Pea, Extra Early Kent.....	" " "	70—85	50	100
" Large White Marrowfat.....	" " "	70—85	50	100
" Improved Dan O'Rork.....	" " "	70—85	50	100
" McLean's Little Gem.....	" " "	70—85	50	100
" Best of Early Dwarf.....	" " "	70—85	50	100
" Ferry's First and Best.....	" " "	70—85	50	100
Corn, Early Minn. Sweet.....	" " "	70—85	50	80
" Stowell's Evergreen.....	" " "	70—85	50	80
Beet, Long Dark Blood.....	" " "	70—85	100	75
Carrot, Large Orange.....	" " "	70—85	100	51
Radish, E'ly l'ng scr'l't short t'p	" " "	70—85	100	26
Onion, Large Red Weathersfield	" " "	70—85	100	73
Lettuce, Frankfort Head.....	" " "	70—85	100	20
Radish, Chinese Rose Winter.....	" " "	70—85	100	40
Carrot, Early Scarlet Horn.....	" " "	70—85	100	92
Cauliflower, Extra Early Paris.....	" " "	70—85	100	6
Lettuce, Simpson's E'ly Curl'd	" " "	70—85	100	100
Cucumber, L'ng green improv'd	" " "	70—85	100	92
Celery, Seymore's White Solid.....	" " "	70—85	100	6

D. M. Ferry & Co.

Seeds bought in Lansing.

Variety of Seed.	Mode of Testing.	Temperature	Seeds Tested.	Percent Germinated.
Salsify.....	Damp paper on moist sand	62°—70°	100	35
Turnip, White Egg.....	" " "	62—70	100	20
Radish, Early Round Scarlet.....	" " "	62—70	100	98
Onion, Large Red Globe.....	" " "	62—70	100	89
Carrot, Long Orange.....	" " "	62—70	100	59
Spinach, Round Summer.....	" " "	62—70	100	72
Radish, E'ly l'ng scr'l't short t'p	" " "	62—70	100	55
Onion, Large Red Weathersfield	" " "	62—70	100	91
Lettuce, Frankfort Head.....	" " "	62—70	100	36
Radish, Chinese Rose Winter.....	" " "	62—70	100	60
Spinach, Prickly Winter.....	" " "	62—70	100	99
Beet, Long Dark Blood.....	" " "	62—70	100	92
Lettuce, Early Tennis Ball.....	" " "	62—70	100	98
Carrot, Early Scarlet Horn.....	" " "	62—70	100	67
Cauliflower, Early Paris.....	" " "	62—70	100	4
Cabbage, Fotters imp. Brunswi'k	" " "	62—70	100	89
Lettuce, Early Tennis Ball.....	Porous plates.....	75—45	100	99
Radish, Early Round Scarlet.....	" " "	75—45	100	92
Onion, Large Red Globe.....	" " "	75—45	100	85
Tomato, Acme.....	" " "	75—45	100	96

OTHER EXPERIMENTS.

As my estimates of \$400 a year, for making experiments, were reduced to \$300 a year by the Board of Agriculture, and so passed the Legislature, I was obliged to curtail my plans somewhat. Several of the experiments begun some years ago, were by mutual consent turned over to Professor Satterlee. Mr. Troop has been employed for about half a day during the year. His time has been taken up in helping to teach the seniors in laboratory work, where the class was too large for one person to instruct. He has done some work in the museum, reārranging and poisoning specimens, something in the arboretum, and something in the botanic garden, besides making most of the experiments. Owing to excessive rains, a cool summer, and an early frost, I have, in numerous cases, been obliged to abandon experiments, and throw the untrustworthy notes into the waste basket. Prominent among these were some experiments, begun this year, in continuation of those made in former years to prove whether bumble bees and honey bees were of any value in improving the crop of seeds in red clover, alsike clover, white clover and buck-wheat.

The plats of red clover sown this spring have done well, and have been of much interest. The seeds for most of the plats were in each case selected from one plant noted for some striking peculiarities. The seedlings do not all take after the parent, and this was to be expected.

The seedling grapes must be tried another year, as they failed to produce fruit, or failed to ripen any. A few seedling currants, and gooseberries, and raspberries have been left for further trial, as they showed some promising points.

THE ARBORETUM.

This has done very well, though the dry weather following the long spring rains in some instances caused fungi to take hold of the leaves and cause them to drop prematurely. A few sorts of trees have been added; all have been well cared for. They have been trimmed, and thined, and cultivated where it seemed necessary.

We have completed labeling all the kinds of trees in the arboretum. The labels on trees about the grounds have been renewed. Many of the old ones painted on zinc had lasted thirteen years.

THE HERBARIUM.

This has been increased by the addition of some local specimens. We have nearly completed a local collection of plants for students' use. Duplicates of grasses, ferns, and some other things, have been placed in the herbarium for the examination of classes in botany.

I have purchased with my own money, at a cost of about \$80, a set, so far as completed, of Ellis's Fungi of North America.

THE BOTANIC GARDEN.

Some improvements have been made, some plants added and quite a large number were lost on account of the unusual rains which flooded a considerable portion of the garden for five days at three different times. L. H. Bailey, jr., now caring for the botanic gardens of Harvard university, has sent us several very desirable packages of plants. We have sent some in exchange.

Mr. Bailey was a member of the graduating class of this college in 1882. The ground about the lower pond has been raised and widened, so it will be ready for plants in the spring. This will complete the garden according to the plan printed in my last report. Quite a number of the grasses formerly in plats south of the apiary have been placed east of the larger pond, where the *gramineae* or grasses are to be located.

DONATIONS.

The following is a list of the donations for the year to the department of botany and forestry:

G. W. Osborn, Mendon, Mich.:

15 ears dent corn—three varieties.

Rev. C. J. Strang, Dowagiac, Mich.:

Oak log—natural graft.

H. M. Engle, Marietta, Pa.:

A one-year-old bush of Orange gooseberry.

Hiram Sibley & Co., Rochester, N. Y.:

Two quarts imported Dutch flax seed, and two lots of spring wheat.

L. G. Lemmon, Oakland, Cal.:

Two species of native Arizona potatoes.

The botanic gardens, Cambridge, Mass., sent by L. H. Bailey, jr.

The following list of plants for the botanic garden:

Ranunculus acris, *Aconitum uncinatum*, *Lycopus Europæus*, *Bellis perennis*, *Nephrolepis exaltata*, *Fragaria Mexicana*, *Iris Sanguinea*, *Iris pallida*, *Stellaria holostea*, *Lychis versicaria*, *Geum triflorum*, *Physostegia Virginiana*, *Monarda didyma*, *Dicentra eximia*, *Sida napaea*, *Tolmeia Menziesii*, *Diphylleia cymosa*, *Trillium sessile*, *Hypericum Buckleyi*, *Sedum Rhodiola*, *Spiraea lobata*, *Sedum ternatum*, *Sedum sexangulare*, *Rhus aromatica*, *Petasites vulgaris*, *Aspidium dilatatum*, *Aspidium Bootii*, *Aspidium Goldianum*, *Aspidium Felix-mas*, *Artemisia Ludoviciana*, *Artemisia serotina*, *Erigeron speciosus*, *Silphium trifoliatum*, *Heliopsis laevis*, *Rudbeckia pinnata*, *Boetonia asteroides*, *Solidago sempervirens*, *Grindelia squarrosa*, *Galium molluga*, *Myrrhis odorata*, *Astilba chinensis*, *Kerria Japonica*, *Psoralea onobrychis*, *Thermopsis Caroliniana*, *Hydrangia arborescens*, *Phlox tuberosa*, *Stachys aspera*, *Betonica officinalis*, *Pycnanthemum muticum*, var. *filosum*, *Pycnanthemum linifolium*, *Mentha sylvestris* var. *Candicans*, *Gratiola officinalis*, *Phlox amœna*, *Phlox paniculata*, *Phlox stellaria*, *Polemonium reptans*, *Polemonium cœruleum*, *Pyrethrum roseum*, *Lysimachia nummularia*, *Tiarella cordifolia*, *Viola sagittata*, *Orchis*? *Claytonia Caroliniana*, *Asplenium*? *Glyceria obtusa*, *Sporobolus serotinus*, *Asclepias incarnata pulchra*, *Leontodon autumnale*, *Trillium recurvatum*, *Trillium erectum*, *Trillium sessile*, *Uvularia puberula*, *Uvularia flava*, *Adonis vernalis*, *Actaea spicata* var. *rubra*, *Actaea spicata* var. *arguta*, *Thermopsis Caroliniana*, *Phlox glaberina*, *Oenothera fruticosa*, *Clematis ochroleuca*, *Clematis Pitcheri*, *Clintonia umbellata*, *Erythronium Dens-Canis*, *Eryanthus hyemalis*, *Iris reticulata*, *Carex gracillima*, *Carex squarrosa*, *Carex arctata*, *Carex folliculata*, *Carex agarta*, *Phlox pilosa*, *Potentilla tridentata*, *Rubus odorata*, *Scilla Siberica*, *Lygodium palmatum*, *Dicksonia punctilobula*, *Geum macrophyllum*, *Fragaria vesca*, *Fragaria elatior*, *Limnanthemum nymphaeoides*, *Marsilea quadrifolia*, *Poterium Canadense*, *Astilbe decandra*, *Galanthus nivalis*.

Also seeds of the following :

Silene inflata, *Adonis vernalis*, *Actæa spicata rubra*, *Geranium Robertianum*,
Mellica altissima, *Mellica ciliata*, *Eleagnus longipes*.

J. B. Cotton, Albion, Ind.:

Five ears yellow dent corn.

Oliver McLouth, Addison, Mich.:

Four ears yellow dent corn (monstrosities).

Isaac Sloan, Holt, Mich.:

Specimen of peat from Ireland.

Hugh Dale, Marlette, Mich.:

One dozen ears Flint corn, crop of 1882.

J. R. Newton, South Carolina:

Bundle of rice.

Prof. F. A. Gulley, Agricultural College, Miss.:

Bundle of rice.

Mrs. M. J. C. Merrell, Lansing, Mich.:

One ear corn with kernels both outside and inside the cob.

One ear yellow dent corn (monstrosity).

Prof. W. W. Tracy, Detroit, Mich.:

One package flower seeds from Idaho Territory.

“ “ “ “ Washington Territory.

Three packages lily bulbs from “ “

One “ “ seeds “ “ “

The completeness of my former report, for 1881-82, has made it seem unnecessary to go much into details at this time.

Respectfully submitted,

W. J. BEAL,

Professor of Botany and Forestry.

Agricultural College, Sept. 29, 1883.

REPORT OF THE DEPARTMENT OF MATHEMATICS AND CIVIL ENGINEERING.

To the President :

I have the pleasure of submitting to you the following report of the department of mathematics and civil engineering for the year ending September 31st, 1882.

CLASS INSTRUCTION.

The classes taught by myself have been as follows :

Fall Term, 1882.

Civil engineering to the senior class. Mechanics, one-half term, to the junior class.

Spring Term, 1883.

Trigonometry and surveying, in two divisions to the sophomore class.

Summer Term, 1883.

Astronomy, elective with veterinary, (one-half of the class electing each,) taught to the senior class. Mechanics taught to the junior class.

Fall Term, 1883.

Civil engineering to the senior class. This study was elective, and was chosen by 13 out of 26 students. Mechanics, one-half term to the junior class. Algebra, one-half term to the freshman class.

The report of the classes taught by the assistant in mathematics is appended to this report.

The course in the various studies is substantially as described in the catalogue for 1882-3, except in civil engineering. This study having been made elective, has been also made somewhat more technical, instruction was given on the following subjects: Architecture, building, limes, mortars, and cements, higher surveying, and construction of common walls and bridges. The subject of higher surveying being introduced for the first time in this study.

MECHANICAL OPERATIONS.

The principal portion of my duties relate to work in connection with the position of superintendent of construction in brick and iron. The duties of this position require much time and thought, and frequently absorb time that could profitably be given to my class work. I have, however, done the best I could. The following heads are an enumeration of the principal constructions in my charge:

Boiler House and Chimney.

I prepared plans and specifications for this structure, and have superintended the construction to date. This building will include boiler room, pump and engine room, steam fitting shop, and a house for the engineer. The chimney will set on a foundation of concrete 16x16 feet, and 8 feet in depth. The chimney is to have a flue 4x4 and to be 65 feet high.

The building will not be finished until 1884. The contract was let to Olin and Sproas, of Meridian, for \$4,950, the appropriation being \$5,000.

The preparation of the plans and specifications, and superintending the construction, has taken a great deal of time, and has been a subject of anxious care.

Water Works.

The construction of the system of water works, for which an appropriation of \$4,267 was made by the last legislature, was, with the consent of the State Board of Agriculture, undertaken by myself.

The plan laid before the Board, and adopted, involved the use of the wooden pipe made by the Michigan Pipe Co. of Bay City; valves made by James Flower & Bro., Detroit; hydrants made by the Holly Co. of Lockport, N. Y.; a Worthington high pressure pump, capacity 750,000 to 1,000,000 gallons per day of 24 hours. The plan comprehended the furnishing of water for extinguishing fires and other purposes in the College buildings, excepting the residences, and combines a direct and indirect pressure plan. A tank holding 300 barrels is placed in the tower of Williams Hall, 80 feet from the ground, and provides pressure and water for ordinary use. It is also believed that it will

hold a supply that, in case of fire, would answer until the steam pumps could be set working. By opening the proper valves and closing the connection to the tank, pumping can be done directly into the lines of pipe. It was not expected that this system would be completed before 1884. At date of this report the following has been done: The underground pipe has been all laid, and, except the suction pipe, has been tested.

This work was done under my immediate oversight, by day laborers, by students, and by our engineer, Mr. Hawes. Although the wet weather made the excavation very costly, probably increasing the cost by \$100 at least, over what it would have been in good weather, it was still kept within the estimate for that item. The hydrants have been set, and with our hose water can be thrown on the barns, piggery, botanical laboratory, chemical laboratory, College Hall, Wells Hall, Williams Hall, and museum and library, in most cases from two hydrants. The hydrants, excepting one at Wells Hall, one at cattle barn, one at museum and library, are on short line of four-inch pipe connecting with six-inch pipe. The steam pump has been set, the foundation being made of concrete; it has not, however, had all the connections made to it. The large tank was erected in the tower of Williams Hall by the Lansing Iron Works for \$435. It is made of C. H. No. 1 boiler plate iron, one-quarter inch thick.

The iron beams and iron work supporting the tank was erected by ourselves, and altogether formed the most difficult portion of the whole job. The beams, 16 feet long and weighing 900 pounds each, had to be raised outside the tower, swung out over a projecting roof, and finally slid through a window into position. It was however accomplished without an accident.

A small hose cart and 300 feet of $2\frac{1}{2}$ inch hose has been purchased of H. D. Edwards & Co., Detroit.

The details of the construction will be given more in full after the works are completed. The works are constructed in such a way that hereafter they can be extended at any time with little expense.

Brick Making.

Because of the high price and bad color of brick made in the yards near Lansing, it was decided by the Building Committee, to make the bricks to be used in the boiler house and Professor's residence. This work was put in my charge. From the commencement until September 15 Mr. Henry Palmer, a former student, acted as foreman of the yard. After that date the brick were made on contract by Mr. W. H. Megivern at the rate of \$4.50 per M.

The number of brick made were nearly 400,000, the actual cost per M. averaged, as near as can be estimated, \$5.50. The brick are of uniform red color and are in every way first-class. Much poorer brick, partly white and partly red, could not have been purchased less than \$7.00 per M. The bricks would have been made fully \$1.00 per M. less had the season of 1883 been favorable. The first season's work on a new yard includes a great deal in the way of permanent improvement that is lost if the yard is used only one season, and consistent with the above statement, offers have been made the College to make brick for the season of 1884 at a very low rate. The value of the tools on hand is \$50.00, the lumber \$75.00. The latter will be turned over to the Horticultural Department. The especial brick-making tools will be sold when opportunity offers unless the Board order otherwise.

Sewer to Museum and Library.

A six-inch sewer pipe was laid early in the season from the museum and library building to a point on the main sewer from Williams Hall, below the boiler house; closets were also erected in this building. The cost came within the estimate, viz, \$350.

The above work was done principally by student labor. The excavation was very deep and we were much troubled by water and quicksand.

SURVEYING AND ENGINEERING.

Drain and general surveying is in my charge. We have commenced a topographical survey of the college farm and in the fall of 1883 finished that portion lying in the township of Lansing.

A careful survey of the above land shows a considerable discrepancy between the land occupied and that called for in the deed. The topographical survey will be continued in the summer of 1884. Very little drain surveying has been done, except to reset stakes on drain in fields No. 12 and 14.

INSTRUCTION IN MECHANICAL OPERATIONS.

At date of writing this report no systematic instruction has been attempted in mechanical work, the difficulty has been two-fold, want of time on my part, and want of a proper room. The last legislature appropriated for the purchase of tools for such instruction and repairs in iron work \$1,000—the expenditure of which the State Board of Agriculture placed in the hands of Hon. H. G. Reynolds and myself. We propose to purchase a small engine and engine lathe for iron work repairs and several sets of tools for working in wood and iron for instruction. I then hope to be able to offer to such students as desire it an opportunity to obtain instruction with the use of tools. This work will not be paid for.

OUR PRESENT BOARDING SYSTEM.

Being secretary of the committee on the club system of boarding, appointed by the State Board of Agriculture, I have had much to do with the plan of boarding now in operation. The following will I think give a clear idea of the system:

The law establishing the college, requires that board be furnished the students at cost. In order to comply with the law, previous to the year 1883, the State Board of Agriculture employed a college officer, paying him a salary of \$600 to \$800 per year, known as the steward, whose duties were simply to run the boarding establishment. At the request of the students this office was abolished Jan. 1st, 1883, and the boarding plan as described below adopted. This change in no way affects the labor plan.

The system adopted was to divide the students into five groups, to be known as Clubs, and respectively designated by the letters of the alphabet, A, B, C, D, and E. Each Club elects from among its number a steward, who duties are to buy provisions, employ help, and look after the business of the Club. During the year 1883 he collected and disbursed all moneys. During 1884 the Secretary of the College has consented to act as Treasurer of the Clubs, and will receive money from the students and pay on orders from the stewards.

An advanced payment on board equal to \$20.00 is required of each student at the beginning of a term. No person is allowed to remain in a Club unless he has money to his credit with the treasurer.

The State Board of Agriculture required the clubs to own most of the prop-

erty they use, and I was authorized to sell at low rates the furniture, dishes, and bedding in Williams Hall.

The amount received from this source and turned over to the Secretary of the College was:

Dishes and furniture sold to Clubs	\$299 81
Furniture and bedding sold others	146 50
Cooking apparatus sold Canada Agricultural College.....	400 00
Bedsteads sold to students.....	104 00
	<hr/>
Team and coal-stove sold by Hon. F. Wells and Sec'y Baird (about).....	\$950 31 300 00
	<hr/>
Rental of stoves for 1883.....	\$1,250 31 75 00
	<hr/>
The property owned by the College in this hall is (see inventory) worth about.....	\$1,325 31 800 00
	<hr/>
Total value.....	\$2,125 31

This property was inventoried as long back as I can find any record at about \$2,500, and we may assume that the original cost to the State of this property was that amount.

The repairs and additions made from time to time, have been properly charged to the students as a part of board, so that the college changes from the old plan of boarding with a loss not exceeding \$375.

The amount of money received in 1883 was in excess of the amount paid out in making the necessary changes in the buildings as shown below.

The cost of building and painting the needed rooms for the clubs has been as near as I can ascertain.....	\$600
The cost of stoves for clubs.....	375
	<hr/>
Total cost (about).....	\$975

The stoves, by vote of the State Board of Agriculture, are rented to the clubs at an annual rental equal to one-fifth the cost, so that the value will ultimately be returned to the college.

The fact that each club owns property makes it necessary to have a permanent fund; this is accomplished by each member of the club paying a membership fee of \$2.50, which is returned to him when he leaves college.

The finances of each club are guarded by a financial committee, and are in such shape as to make it easy to detect any dishonesty at once on the part of a steward.

This system of boarding is better, both for the State and the students, for, in the first place, being entirely separate from the State in its management, the full cost of boarding must be paid by those receiving it; again, it is more flexible in its make-up than the system in charge of a college officer—any abuses arising can be easily remedied without annoyance, or even the knowledge of the college officers.

The college authorities, however, have jurisdiction sufficient to maintain good order, and can, if the good of the college requires, discharge any officer or employé of the club system.

STEAM HEATING.

The efficiency of the steam heating apparatus is being improved from year to year by changes and additions. The heating apparatus in Wells Hall was in very inefficient condition when I first took charge of the steam heating, due

to bad planning and worse execution by the contractors, the Walworth Manufacturing Company. Students were making continual complaints of cold rooms. We have changed the main steam pipes and many of the risers, and, so far as we can ascertain, the rooms are now all heated satisfactorily. To keep this system in efficient working condition needs close and constant attention and facility to make repairs as soon as needed. This facility we have now to a great extent.

R. C. CARPENTER,

Professor of Mathematics and Civil Engineering.

REPORT OF ASSISTANT PROFESSOR OF MATHEMATICS.

To the President :

My work during the past year has consisted principally of class instruction. In the autumn term of 1882 both the freshman and sophomore classes in algebra were in my charge. Each class recited in two divisions, the freshman class beginning Thomson and Quimby's collegiate algebra, the sophomore class completing Wells's university algebra.

In the spring and summer terms of 1883, the freshman class took up and completed geometry, Loomis being used as the text book.

In the spring term the freshman class was under my instruction in free-hand drawing and in mechanical drawing, meeting in two divisions in each study. Each division in mechanical drawing, using Krusi's books, met on alternate days throughout the term. The free-hand drawing consisted of practice with the pencil to train both the eye to see truly and the hand to represent correctly. Such instruction as was needed was given without the use of a text book. It was so arranged that all the work done by the students in the study could be done in the class-room itself under personal direction. The College possesses a set of models, and a number of lithographic drawing studies, but more are needed. The class was some inconvenienced from the crowded condition of the rooms for a part of each day. More room is needed for the time the study is followed.

The following summary gives such other information as may be desired :

	No. Passing.	No. Failing.	No. Leaving	Total.
<i>Autumn, 1882.</i>				
Sophomore, Algebra, Division A.....	17	1	7	25
“ “ “ B.....	15	1	6	22
Freshman, “ “ A.....	14	—	2	16
“ “ “ B.....	14	1	3	18
<i>Spring Term, 1883.</i>				
Freehand Drawing, Division A.....	25	1	—	26
“ “ “ B.....	22	—	—	22
Mechanical “ “ A.....	22	2	1	25
“ “ “ B.....	20	1	2	23
Geometry, Division A.....	21	6	—	24
“ “ “ B.....	16	5	2	23
<i>Summer Term, 1883.</i>				
Geometry, Division A.....	21	1	—	22
“ “ “ B.....	17	6	1	24

Respectfully submitted,

LOUIS G. CARPENTER,
Assistant in Mathematics.

REPORT OF THE LECTURER* ON VETERINARY SCIENCE.

To the President :

My work in this branch of science commenced at the beginning of the summer term of 1883, and in compliance with my agreement with the college, the entire subject was disposed of in twelve weeks.

The class was composed of a portion of the senior students, and a few from the juniors. The lectures and demonstrations were arranged as follows:

The first four days of each week were devoted to lectures upon the diseases of the domestic animals, more especially those which are of every day occurrence, they being discussed in a systematic manner, according to the anatomical divisions of which the animal economy is composed. The individual diseases were described by beginning with the nature of the malady, next its causes, then its symptoms, followed by the treatment, and closing with a preventive, when possible.

The various complaints were illustrated, in some instances by pathological specimens of actual cases, in others by diagrams, and, when possible, by the living animal with the disorder already existing. Unfortunately for us (myself and the class), our means of illustration were unavoidably very scant; this course being hitherto only temporary, it could scarcely be otherwise.

The principal subjects which were lectured upon were:

The diseases of the skeleton—Bone spavin, splint, ringbone, besides others of less frequent occurrence.

The diseases of joints—Bog spavin, wind-galls, curb, dislocations, etc.

The diseases of muscles—Sweeney. The treatment of various kinds of wounds.

The diseases of the teeth—The mode of determining the age of animals by the same.

The diseases of the digestive organs—Hoven in cattle, inflammation of the bowels, worms, colic, and many other common diseases.

The diseases of the foot—Founder, sand crack, corns, thrush, and the like.

The diseases of the circulatory system—Those of the heart and large blood vessels.

The diseases of the organs of respiration—Pleurisy, inflammation of the lungs, bronchitis, nasal gleet, catarrh, etc.

The diseases of the urinary organs—Inflammation of the kidneys, stone in the bladder, etc.

The diseases of the nervous system—Lock-jaw, string-halt, paralysis.

The diseases of the organs of generation, and those accompanying parturition—Milk fever, abortion, inflammation of the udder, inflammation of the womb, &c., with a description of how to manage females and adjust the fœtus in difficult cases of labor.

Diseases of the eye—Cataract, etc.

Diseases of the skin—Scratches, mange, ring-worm, and other parasites.

Zymotic diseases—Glanders, pink-eye, distemper, pleura pneumonia, etc.

The last day of each week was devoted to a description of many of the most important drugs used in veterinary practice, explaining their actions and uses, the diseases they should be given in, and when and why contra indicated, with the doses, for the different domestic animals.

Towards the close of the term, several days were devoted to the examination

Mr. Grange* has since been appointed Professor.—[T. C. A.]

of live horses for soundness, and the points which should be rejected as unsound pointed out, and the general contour of the animal discussed. In future, the external form of the horse will receive a much greater amount of consideration. Owing to the limited amount of time allowed for this subject, it was not considered advisable to take up the anatomy of the domestic animals, but as it has been determined to extend the course of instruction to the whole collegiate year, this important branch of the science will receive due attention. In addition to the duties of the class-room, I was required to attend and prescribe for the sick animals upon the farm, the cases brought under my notice being some of influenza, others of sore throat, and a few cases of lameness, which yielded satisfactorily to treatment.

E. A. A. GRANGE,
Veterinary Surgeon.

REPORT OF THE PROFESSOR OF ENGLISH LANGUAGE AND LITERATURE.

To the President :

I respectfully submit the following brief report of my work for the year 1882-3. The appointment of a librarian relieves me of all duties but class room work, and the Wednesday afternoon and winter institute lectures. An account of my work may be given, therefore, in few words.

During the autumn term, 1882, I took the freshmen, numbering forty-three, and reciting in two divisions, over D. J. Hill's *Elements of Rhetoric and Composition*. The work embraced all the elementary processes of writing, from the choice of subject, to the criticism of the completed production. As a part of the class work, each student presented three compositions,—a description, a narrative, and a letter,—bringing at different times for approval, suggestion, and criticism, the subject, the outline, and finally the completed piece, which was read and criticised in presence of the class. All manuscripts were carefully corrected, and reason for correction explained or noted. The class met in the chapel every Saturday morning, for declamation, each student declaiming three times during the term. Short exercises were given the class in concert for drill in vocal culture, expression, position, and gesture.

During the spring term, 1883, I gave instruction to twenty-nine juniors in advance rhetoric, using A. S. Hill's *Principles of Rhetoric* as a text-book. The rudiments of style were rapidly reviewed, and the subjects of narration, description, conviction, and persuasion thoroughly discussed. Each student, presented, in presence of the class, three exercises, applying the rules for descriptive, narrative, and argumentative composition, subjects and outlines being presented for approval and criticism, before the exercises were prepared, and the manuscript being passed in for criticism and correction subsequently. I had also this term, a division of twenty-six sophomores in higher English, Swinton's *Forty Masterpieces of English Literature* was used as a text-book. Class-room drill consisted, as heretofore, in cultivating a proper expression when reading aloud; mastery of the thought of the selection, considering, first general meaning, then details, peculiarities of style, allusions, and special merits and defects. Familiar lectures were given on the authors read; and critical essays, embodying the result of study, were prepared by the class,

each member presenting two exercises. Choice selections were also committed to memory and declaimed before the class. The class received occasionally an elocutionary drill, in concert, in the chapel, all having committed the same selection.

During the summer term, 1883, twenty-eight juniors were under my instruction in the History of English Literature. Backus's edition of Shaw's textbook was used, supplemented by lectures. Selections were read from Chamber's Encyclopedia of English Literature, and formed the basis of familiar exposition, criticism, and essays. Morley's Tables of Literature, enlarged, afforded aid in properly placing authors in epochs, and showing their historic relations. Three critical essays were presented by each member of the class, as a part of the term's work.

During the entire year the seniors met with me weekly for essays on literary subjects, previously assigned. Each senior presenting six essays during the year. The study of English Literature was thus continued for three terms. These essays were criticised in the class, and the manuscript afterwards carefully corrected. The juniors met me weekly for reading in Shakespere's plays; Othello, King Lear, and Midsummer Night's Dream, were read with critical comment and explanation. It has been also my duty to prepare seniors and juniors for public orations. These exercises aggregate about one hundred and twenty, during the year. This work, including aid in choosing subjects, analysing them, collecting facts, illustrations, and arguments, criticising the complete oration, and drilling in delivery, is fully equal to the instruction of a class throughout the year.

My work outside of the class-room has been but little. I have given two Wednesday afternoon lectures; one repeated from the winter institutes, and given at Armada, Jeddo, Trent, and Farmington, and the other on "The Personal Character of John Milton."

During the fall and spring terms, I still had charge of the library. The routine work was done by student labor, one student being permanently employed, and others employed as occasion demanded. The data for a detailed report were passed over to Mrs. Merrell, the new librarian, when she took charge of the library, July 1st, and for a minute account of library matters, I refer to her report.

Very respectfully submitted,

E. J. MacEWAN,
Professor of English Language and Literature.

REPORT OF THE PROFESSOR OF HISTORY AND POLITICAL SCIENCE.

To the President:

I beg leave to submit the following report from the department of history and political economy for the college year closing on the 14th of August, 1883.

HISTORY.

Instruction was given daily in the autumn term to the freshman class in the outlines of ancient history. The plan of the work was substantially that

described in my last report. Swinton's "Outlines" was used as the basis of instruction, being accompanied with illustrations and additions by the teacher and the report of individual topical study by the students. The class, consisting of fifty-two persons, was divided into two sections. At the final examination four failed to pass.

POLITICAL ECONOMY.

A course of twelve weeks, daily lectures and recitations, was given to the senior class in the spring term. Chapin's Wayland's "Elements of Political Economy" was used as a guide. Twenty-seven were enrolled and passed the final examination.

UNITED STATES CONSTITUTIONAL LAW.

A course of six weeks in this subject was given to the senior class. Cooley's "Principles" was used as a text-book. Of thirty members of the class all but one passed the final examination.

A considerable part of my work has been connected with the department of English literature, and is described in the remainder of this report.

HIGHER ENGLISH.

The details of the work are given by the Professor of English Literature. I gave instruction daily during the spring term to one division of Sophomores, numbering twenty-six. One person did not complete the course, but the remainder were successful in the final examination.

ENGLISH LANGUAGE.

Daily instruction during the summer term was given to the freshman class in English etymology and the use of words. Abbott's "English Lessons for English People" was used as a text book. Forty-seven persons pursued the subject, meeting in two divisions. Four failed to pass, and one left during the term.

RHETORICALS.

I have given instruction during the year in declamation, critical reading, essays, and speeches, as follows:

Autumn term.—Juniors, 2 essays, 33 students; sophomores, 2 declamations, 1 essay, 48 students.

Spring term.—Sophomores, 2 declamations, 1 essay, 26 students; freshmen, selections from Irving, 46 students.

Summer term.—Sophomores, 2 original speeches, 42 students; freshmen, 3 declamations, 3 essays, 47 students.

It thus appears that 289 exercises in declamation have been listened to and criticised, and that 365 manuscripts have been presented. The latter have been criticised after being read in the class room, and in writing after careful examination by the instructor. In most cases, also, students have received private oral instruction in connection with these exercises.

Respectfully submitted,

GEORGE H. HARROWER,

Professor of History and Political Economy.

REPORT OF THE LIBRARIAN.

To the President:

The report here presented covers the year from October 1, 1882, to October 1, 1883, the first nine months of which time the library was in charge of Prof. MacEwan who, in the report of 1881-82, fully described the new building and gave an outline of the work done in the library.

No change was made in the conduct of the library until the first of July, 1883, when the management was given into the hands of the newly-appointed librarian. She retained, until his graduation, in August, Mr. L. A. Buell, as assistant librarian.

According to the last report there were in the library "6,135 volumes, valued at a little more than \$15,000, and 800 pamphlets and unbound volumes worth, perhaps, \$100 (exclusive of catalogues of schools, museums, publications, etc)."

There have been added during the year past, by purchase, 78 volumes at a cost of \$193.54; by gift and exchange 66 volumes valued at \$75.00; by pamphlets 55, at a valuation of \$5.00, making a total valuation of \$15,273.54, irrespective of books bound or now at the bindery. The additions by binding are 150 volumes; the expense of binding \$227.00; the library therefore numbers now, aside from duplicate reports and public documents, 6,429 volumes and 855 pamphlets, the whole valued at more than \$15,500. There are also sixty partial volumes completed in December next, which will then be bound for preservation and use.

The following periodicals were received in the library this year, having been subscribed for and bound:

FOREIGN PERIODICALS.

Agricultural Gazette.	Journal of the Chemical Society.
Annals de Chémée et de Physique.	Journal of Science.
Blackwood's Magazine.	Knowledge.
British Quarterly.	London Quarterly Review (reprint).
Westminster Review (reprint).	London Times, weekly edition.
Contemporary Review. (Reprint.)	London Veterinarian.
Chemical News.	London Journal of Anatomy and Physiology.
Canadian Entomologist.	Nineteenth Century (reprint).
Edinburgh Review. (Reprint.)	Nature.
Engineering.	North British Agriculturist.
Fortnightly Review. (Reprint.)	Spectator.
Gardener's Monthly.	Westminster Review. (Reprint.)
Garden.	
Gardener's Chronicle.	

AMERICAN PERIODICALS.

American Architect and Building News.	American Monthly Microscopical Journal.
American Agriculturist.	American Banker's Magazine.
American Poultry Journal.	American Chemical Journal.
American Bee Journal.	Breeder's Gazette.
American Bookseller.	Century.
Atlantic Monthly.	Critic.
American Naturalist.	

Country Gentleman.
 Detroit Daily Post and Tribune.
 Dial.
 Education.
 Farmer's Review.
 Harper's Magazine.
 International Review.
 Independent.
 Journal of Franklin Institute.
 Journal of Mathematics.
 Journal of American Agricultural Association.
 Journal of Forestry.
 Literary World.
 Michigan Farmer.
 Microscope, The.
 Magazine of American History.
 Mathematical Magazine.
 Monograph.
 Manufacturer and Builder.
 Monthly Reference List.

Nation.
 National Live Stock Journal.
 Northwestern Farmer.
 North American Review.
 New York Semi-weekly Tribune.
 Papilio.
 Popular Science Monthly.
 Prairie Farmer.
 Pysche.
 Plumber and Sanitary Engineer.
 Rural New Yorker.
 Sanitary News.
 Scientific American.
 Scientific American Supplement.
 Science.
 Science Observer.
 Van Nostrand's Engineering Magazine.
 Wallace's Monthly Magazine.
 Watchman.

The following are subscribed for, but are not bound :

Chicago Daily Tribune.
 Detroit Daily Free Press.
 Indiana Farmer.
 Iowa Homestead.

Iowa State Register.
 Memphis Appeal.
 Mirror and Farmer.
 New England Homestead.

The following periodicals, donated by the publishers or by Government, are bound as volumes are completed :

American Bee-keeper's Magazine.
 American Missionary Magazine.
 Boston Journal of Chemistry.
 Bulletin of the Essex Institute.
 Circulars of Information, U. S. Educational Bureau.
 Gleanings in Bee Culture.

Grange Visitor.
 Lansing Tri-Weekly Republican.
 Official Gazette of U. S. Patent Office.
 Practical Farmer.
 Unitarian Review.
 Vick's Monthly Magazine.

Through President Abbot, the library regularly receives the current numbers of Princeton Review and Christian Union.

The following are given by publishers, or others, and are kept on file in the reading room :

Advance.
 American Cultivator.
 American Rural Home.
 Adrian Weekly Times.
 Appleton's Literary Bulletin.
 Battle Creek Journal.
 Bee and Poultry Magazine.
 Cincinnati Grange Bulletin.
 Charlotte Republican.

Charlevoix Journal.
 Christian Register.
 Clinton Independent.
 Coldwater Republican (semi-weekly).
 City and Country.
 Deaf Mute Mirror.
 Farm and Fireside.
 Farmer's Bulletin.
 Farm, Herd, and Home.

Flint Globe.
 Ft. Gratiot Sun.
 Grand Rapids Post.
 Grand Rapids Times.
 Georgia Experiment Station.
 Grand Haven Herald.
 Greenville Independent.
 Hillsdale Standard.
 Industrialist.
 Ingham County News.
 Illinois Crop Reports.
 Imports and Exports of the United States.
 Illustrated Herald.
 Ionia Standard.
 Kalamazoo Telegraph.
 Little Granger.
 Lansing Sentinel.
 Lansing Journal.
 Locomotive.
 Midland Republican.
 Midland Sun.

Microcosm.
 Moderator.
 Monroe Commercial.
 Naturalist's Monthly Bulletin.
 New England Farmer.
 Our Young People.
 Ohio Crop Reports.
 Owosso Times.
 Reed City News.
 Romeo Observer.
 Saginaw Morning Herald.
 St. Louis Leader.
 Scientific Roll.
 South Carolina Crop Reports.
 Union Signal.
 Tennessee Crop Reports.
 Three Rivers Tribune.
 Traverse Bay Eagle.
 Weekly Globe and Canada Farmer.
 Wolverine Citizen.
 Wisconsin Agricultural.
 Ex. Station Bulletin.

The whole number received is	
By subscription—Foreign	25
American	64
By donation	74
Total	163

The following are the donations to the library:

From the Department of State, Washington, D. C.

Census of United States, 1880.
 Report United States Coast and Geodetic Survey.
 The Sorghum Sugar Industry; the Report of the National Academy of Sciences.
 War of the Rebellion and Official Records of Union and Confederate Armies, Series 1, Vol. 9.
 Smithsonian Institute.
 Smithsonian Report, 1881.

From Mrs. Harriet A. Tenney, State Librarian, Lansing.

Michigan Pioneer Collections, 1879-80.
 Michigan Report, vol. 47, 1881-2.
 Michigan Report, vol. 48, 1882.
 Statutes of the United States Army.
 Michigan Report, vol. 49.

W. I. Latimer, Auditor General.

Report of the Auditor General, 1881.
 Joint Documents, Nos. 1, 2, 3, 1880.

T. W. Symons.

Upper Columbia River.

John Eaton, Commissioner of Education.

Report of the Commissioner of Education.

Simon Newcomb.

Nautical Almanac, 1885.

Sec. T. J. Burrill.

Illinois Industrial University Report, 1882.

O. D. Conger.

Senate Journal, 1st session 47th Congress, 1881-2.

House Journal 47th Congress, 1881-2.

Report of Commissioner of Education.

Lieut. Col. Comstock.

Triangulation of U. S. Lake Survey, No. 24.

Hon. T. Robitaille.

Vol. 15, Journal of Legislative Council, Quebec.

Journal of Legislative Assembly, Quebec.

Sessional papers, Quebec, 1881-2.

Vol. 17, Journal of Legislative Assembly, Quebec, 1883.

Hon. H. G. Wells.

The Geneva Award Acts.

Prof. Edward Orton.

Geological Survey of Ohio, Zoölogy and Botany.

Hon. O. L. Spaulding.

War of the Rebellion.

Total Eclipse of July 29th, 1878.

Official Report of the War of the Rebellion.

Hon. O. D. Conger.

House Journal 47th Congress, 1881-2.

Report of Commissioner of Education.

L. P. Lemay, Quebec.

Session papers, vol 15, No. 1.

James O. Adams.

Reports of the State Board of Agriculture of New Hampshire for the years 1874, 1875, 1879, and 1880.

Gov. O. M. Roberts.

Texas, Resources and Advantages.

T. S. Gold.

Report of Connecticut Board of Agriculture, 1882.

J. E. Hilgard.

U. S. Coast Survey.

Brig.-Gen. S. P. Benét.

Report of the Chief of Ordnance, 1882.

Brig.-Gen. H. G. Wright.

Annual Report of Chief of Engineers, parts I. and III; also vol. 2.

Dr. R. C. Kedzie.

Report of the State Board of Health of Michigan.

Bureau of Navigation, Washington, D. C.

Ephemeris for 1886.

President James Mills.

Ontario Agricultural Report for 1882.

Harper Brothers.

Loomis's Elements of Calculus.

“ Algebra.

“ Elements of Algebra.

“ Algebraic Problems.

“ Analytical Geometry.

“ Geometry.

“ Elements of Astronomy.

Nellie Sisley.

Life Sketches.

Life of Wm. Miller.

Life of Bates.

History of the Sabbath, J. N. Andrews.

Religious Amendment to the Constitution, W. H. Littlejohn.

Spirit of Prophecy, 3 vols., Mrs. E. G. White.

Thoughts on Revelation, U. Smith.

G. B. Dixwell.

Bastiat's Sophisms of Protection.

G. B. Stebbins.

American Protectionist's Manual.

Albert Chapman.

Vermont Merino Register, vol. 2.

J. T. Henderson.

Agricultural Report of Georgia for the years 1880, 1881, and 1882.

From Dr. Beal, in exchange.

Transactions Indiana Horticultural Society for 1880.

Minnesota State Horticultural Society Reports, a full set, 1874 to 1883 inclusive.

Transactions Illinois Horticultural Society, vol. 7, 1873, 1874, 1881, and 1882.

A. P. Butler.

Third Annual Report of Commissioner of Agriculture of South Carolina.

Also the following pamphlets:

J. P. Finlay.

Character of 600 Tornadoes.

F. W. Christern.

Catalogue of Foreign Periodicals.

Wm. E. Chandler.

Instructions for observing the Transit of Venus, Dec. 6, 1882.

Prof. E. W. Hilgard.

Catalogues of California Agricultural College.

Gen. W. B. Hazen.

How to Foretell Frosts.

History of United States Signal Service.

Sir J. B. Lawes, LL. D., England.

Equivalency of Starch and Sugar in Food.

Amount and composition of Rain and Drainage Water.

Appearance of Nitric Acid during Evaporation of Water.

Determining of Carbon Dioxide in Soil.

Determining Nitric Acid in Soil.

Determining Nitric Acid in Soils by means of Indigo.

Determination of Nitric Acid as Nitric Oxide, three parts.

On Nitrification, three parts.

Results of Mixed Herbage in Meadows.

Result of Field Experiments, 1880.

Result of Field Experiments, 1882.

Relation of Food to the Animal Body.

Farm Manures and Artificial Manures.

Equivalency of Starch and Sugar in Food.

Formation of Fat in the Animal Body.

Rainfall, Evaporation, and Percolation.

Animal Nutrition.

Vegetation.

Is Higher Farming a Remedy for Lower Prices?

Freedom in Growth and Sale of Crops on the Farm.

Chemistry of Feeding Animals.

Exhaustion of the Soil.

Contribution to Chemistry of Fairy Rings.

Determination of Nitrogen in Soils at Rothamstead.

Annual Meeting of the Chemical Society.

Agricultural, Botanical, and Chemical Results of Experiments on the Mixed Herbage of Permanent Meadows.

J. T. Henderson.

Report of the Commissioner of Agriculture, Ga.

E. J. Donald.

Slavery and Protection.

John Eaton.

Circulars of Information, Bureau of Education.

Henry S. Evans.

Eighth Report of Montreal Horticultural Society.

J. B. Tower.

Practice in Europe with heavy Armstrong, Woolwich, and Krupp Guns.

Wm. H. Scott.

Annual Report of Ohio University.

Pres. C. L. Ingersoll.

Fourth Annual Register of Colorado Agricultural College.

Rev. Thos. Humes.

Report of the 76th year of University of Tennessee and State Agricultural College.

J. L. Cravens.

Catalogue Arkansas Industrial University.

P. T. Quinn.

Fifth Annual Report New Jersey Board of Agriculture.

War Department.

Fortifications of To-Day.

Smithsonian Institute.

Twenty-five Italian, Portuguese, Latin, Spanish, Danish, Swedish, and other foreign pamphlets on various subjects.

War Department.

The motions of Fluids and Solids on the Earth's Surface.

Meteorological and Physical Observations on the East Coast of British America.

Popular Essays on the Movements of the Atmosphere.

Geographical Distribution of Rainfall in the United States.

We have also received Cornell University reports, University of Virginia and Iowa reports and numerous others, to all of which we have returned the catalogue of this institution together with reports of the Board of Agriculture.

An effort is being made to secure full sets of Agricultural reports from each State by exchange, our reports having been sent to all States known to issue annual reports.

The library is kept open daily; on school days it is open eight hours, from 8 to 12 A. M. and from 4 to 8 P. M.; on Saturdays it is open from 9 to 12 A. M. and from 4 to 6 P. M.; on Sundays it is open from 10 to 12 A. M. only.

Every effort is made to make the contents of the library of the greatest assistance to each student; cataloguing has already been done to some extent and will be continued as time permits; the warmth, ventilation, and cleanliness of the rooms are carefully looked after, and a commendable degree of quiet is maintained. The usefulness of the library would be still farther promoted by covering the floors with some material which would deaden sound while it could, at the same time, be speedily and thoroughly cleansed; the amount of sand and dust which is daily brought in, in spite of careful use of mats, renders the use of matting upon the floors very undesirable and the

old strips formerly in use have been laid aside; the main object in covering the floors is to secure a quiet which it is impossible to have where students are continually coming and going and moving from place to place, over bare floors; perhaps no material would answer our purpose better than linoleum, an article which can be washed like wood and which is said to wear well; an additional number of chairs will also be required to accommodate readers in various parts of the room, and it seems desirable that there should be one more chandelier hung in the back part of the room which is now insufficiently lighted; a clock would be a convenience, especially in the evening.

Mention may also be made of the necessity of devising some plan by which students about to leave college shall have the opportunity to settle accounts with the librarian before final settlement with the secretary; perhaps a certificate of settlement would be all that is necessary; a few books are lost each year, and no doubt this plan would decrease the losses.

The number of readers daily visiting the library varies with the nature of their work and the state of the weather; on stormy days the number is larger than on fair days; an account kept on average working days, and covering a considerable period of time, shows that from one-third to one-half of the students in the institution visit the library daily. The length of the visits varies from a few moments to four hours—the longest time possible with the present library hours.

The kind of reading chosen by students for use in the library is usually that which relates to their studies, history, philosophy, the sciences, agriculture; fiction and poetry are read mainly outside, and these are therefore found oftenest charged upon the books.

Some of the books formerly of the second class have been put in the first class, and are no longer removable from the library, viz.: North American Review, Harper's Magazine, The Century, The International Review, all of the British Magazines, and some of the most important books of reference.

Still other changes are contemplated which, it is hoped, will add to the convenience of readers, and be for the best interests of the institution.

Most respectfully submitted,

MARY J. C. MERRELL,

Librarian.

FARMERS' INSTITUTES.

Institutes were held under the auspices of the State Board of Agriculture during the month of January, 1884, as follows:

Berrien Centre, Berrien county, January 15 and 16, to be attended by Professors S. Johnson, R. C. Kedzie, Secretary R. G. Baird, and F. S. Kedzie.

Otsego, Allegan county, January 17 and 18, attended by Professors A. J. Cook, R. C. Carpenter, and George H. Harrower.

Chelsea, Washtenaw county, January 22 and 23, attended by Professors R. C. Carpenter, S. Johnson, George H. Harrower, and Secretary R. G. Baird.

Eaton Rapids, Eaton county, January 24 and 25, attended by Professors W. J. Beal, E. A. A. Grange, and E. J. MacEwan.

Grand Rapids, Kent county, January 28 and 29, attended by Professors R. C. Kedzie, E. A. A. Grange and W. J. Beal.

Caro, Tuscola county, January 30 and 31, attended by Secretary R. G. Baird, Professors A. J. Cook, E. A. A. Grange, and E. J. MacEwan,

Professor Grange was unable to attend the Institutes at Grand Rapids and Tuscola on account of sickness. Professor Johnson lectured in his stead at the former place.

BERRIEN COUNTY INSTITUTE.

This institute was held at Berrien Centre in the Grange Hall.

It commenced with an afternoon session on Tuesday, January 15th, and closed with an afternoon session on the following day.

The sessions of this institute were ably presided over by Hon. Thomas Mars. At every session the hall was crowded to excess, and during part of the time many were unable to get inside.

The programme for this institute was as follows:

AFTERNOON SESSION.

Music.

Prayer.

Address of Welcome—A. Kiegly.

Music.

Sanitary Drainage—Dr. Kedzie.

Experimental Stations—Freeman Franklin.

Love of Home—Mrs. W. J. Jones.

Small Fruits for the Farm and Garden—W. A. Smith.

A Paper by Mrs. S. A. Howe.

Music.

EVENING SESSION, 7:30.

Chemistry in House Keeping—Frank Kedzie.
 Should the Elements of Physiology be Taught in the Common School?—O. A. LaCrone.
 Special Farming—Hon. Levi Sparks.
 The Relation of Education to Agricultural Pursuits—A. C. Palmer.
 Music.

MORNING SESSION.

Music.
 The Agricultural College—Sec. R. G. Baird.
 Direct and Indirect Taxation—C. F. Howe.
 The Farmer in Society—Mrs. A. N. Woodruff.
 Sheep Husbandry—Hon. Henry Chamberlain.

AFTERNOON SESSION.

Music.
 Thoroughbred Stock for Profit—A. N. Woodruff.
 Farm Economy—Prof. S. Johnson.
 Horticultural Contrivances—W. A. Brown.
 A Paper by Mrs. E. Marsh.
 Music.

Mr. A. Kiegley gave the opening address as follows:

LADIES AND GENTLEMEN:—In behalf of the people of Berrien Center and vicinity, I bid you welcome. It affords us much pleasure to have an opportunity of entertaining so many on this occasion, and hope that we may be able to make your visit here a pleasant as well as a profitable one. I will not weary you by trying to explain the objects of these institutes, farther than this: They are farmers' schools for the purpose of making him better acquainted with the principles of agriculture and disseminating that practical knowledge necessary in order to obtain better results, and to make him more successful in his noble calling. This is an age of progress, and if the farmers would keep pace with those of other callings and professions, he must be ever vigilant, ever watchful and eager to embrace any opportunity which presents itself to gain instruction. The time has come when intelligence as well as muscle is necessary to successfully operate a Michigan farm. When we realize that the products of Michigan are brought into competition with those of the cheap lands of the West, we cannot afford to make mistakes or do our farm work in a hap-hazard manner and trust to Providence for results.

Then, again, there is much depending upon the agriculturist. As we go to and fro over this great State of ours and behold the fine and fertile farms, decorated with beautiful homes, and remember that fifty years ago it was a howling wilderness, would it not be reasonable that after all these years of toil and hardship in hewing out of those dense forests these beautiful farms, would it not be reasonable, I ask, that he should sit down and enjoy the fruit of his labors without any responsibilities resting upon him? It would be reasonable, but he cannot, he dare not, for it is an established fact that upon the products of the soil depend the prosperity of our State and Nation. Perhaps this fact has never been more strikingly illustrated than in the present year. On account of the present partial failure of crops there is a cry of distress coming up from every class. Then, as I said before, he cannot, he dare not, rest from his labors, for there is the world of mankind

knocking at his door for the very necessities of life. Then the farmer's position in society is a very responsible one, and much is depending upon him.

Let me say in conclusion, that the object of these institutes is to better qualify us for the important duties we owe to society, and that we may do honor to and dignify our noble calling. The machinery for the accomplishment of this object is complete. We have men with us who have made the science of agriculture a life-long study, and there are many, very many, who have spent years upon the farm, and have a large practical experience, whose surroundings indicate that they have used thought, intelligence, and judgment in their management. The subjects brought before this institute are open for discussion, and we earnestly invite you to participate.

Let me say again, that we are glad to see so many present, and in behalf of the committee of arrangements, in behalf of Berrien county, Pomona Grange, and in behalf of the citizens of Berrien Center and vicinity, I again bid you welcome, one and all. May our meeting prove pleasant and profitable.

Nearly all the papers on the programme were read and discussed, and every one seemed highly pleased with the success of the Institute. The ladies did their part nobly in furnishing dinner and supper on the lower floor of the hall.

ALLEGAN COUNTY INSTITUTE.

This Institute was held January 17th and 18th in Edsell's opera hall at Otsego. The programme was as follows:

THURSDAY EVENING.

Call to order by the President.

Music.

Opening address by Hon. W. C. Edsell, of Otsego.

Music.

"Foreign Markets for our Produce,"—Prof. G. H. Harrower of State Agricultural College.

FRIDAY FORENOON.

Music.

"Insecticides,"—Prof. A. J. Cook of State Agricultural College.

"The Apiary as a Useful Branch of Agriculture,"—T. F. Bingham of Abromia.

"Drainage,"—Prof. R. C. Carpenter of State Agricultural College.

AFTERNOON SESSION.

Music.

"Stock Feeding for Profit,"—Prof. Samuel Johnson of Agricultural College.

Music.

"Women's Work on the Farm—Her true Position and Influence,"—Mrs. L. A. Jewett of Allegan.

"Peach Culture, its Profit and Losses,"—J. H. Dumont of Allegan.

EVENING SESSION.

"How can we Educate the Farmer's Boy and Keep Him on the Farm,"—P. A. Latta of Allegan.

Music.

"Practical Physiology,"—Prof. A. J. Cook of State Agricultural College.

The opening address was given by Hon. W. C. Edsell of Otsego to a large and interested audience. The address was unwritten and we have been unable to obtain a report of it. The attendance at this Institute was very large, and a deep interest was manifest throughout in the subjects presented for consideration.

 CHELSEA INSTITUTE.

This institute was held in the town hall, January 22 and 23. The weather was decidedly unfavorable, but notwithstanding this, there was a good attendance, and a very successful institute. The following programme was substantially carried out:

AFTERNOON SESSION, 2 P. M.

Music—by the Music Director, Geo. Ward.

Prayer—Rev. E. A. Gay.

Address of Welcome—C. H. Wines.

Music.

Paper: "How to Build Farm Drains,"—Prof. R. C. Carpenter, Professor of Civil Engineering and Surveying at the Agricultural College.

Paper: "House and Home"—Mrs. C. H. Wines.

Farm Insurance—James W. Wing.

Music.

EVENING SESSION.

Music—Choir.

Address: "Foreign Markets for our Agricultural Products"—G. H. Harrower, Professor of History at Agricultural Farm and College.

Poem, by William Lambie, the Farmer Poet.

Music.

WEDNESDAY AFTERNOON.

Music.

Prayer—Rev. Dr. Holmes.

Paper: "Sheep Husbandry"—C. M. Fellows.

Address—Samuel Johnson, Professor of Agriculture.

Paper: "Schools and School-Houses"—Mrs. R. F. Johnstone.

Music.

EVENING SESSION.

Music.

Paper: "Fruit for the Farmer"—Evart H. Scott.

The Agricultural College—Secretary R. G. Baird.

Music.

The opening address, by Mr. C. H. Wines, was as follows:

LADIES AND GENTLEMEN: In behalf of the citizens of Chelsea and vicinity, it is my pleasant duty to extend to you a hearty welcome to this institute. The object of this meeting is to disseminate knowledge in science, and practice, through lectures, essays, and discussions on subjects relating to *farm interests*. We live in a progressive age, hence, *progress should be our motto*. For a moment let us compare the past with the present. As my eye passes over this audience I see many who have bent the back, and tested the strength of arm by swinging the scythe through the ripening grass and grain, then followed with fork and rake to stir and gather, by this slow and tiresome process, the ripening harvest. But to-day, thanks to the inventive genius and spirit of the age in which we live, we have a new and better method for doing this work. Now, the man or the boy, with horses attached to the mower, tedder, or rake, without tiresome labor, accomplishes more and better work than half a score of men by the old process. Again, the harvester, which is of more modern date, what a *wonderful* change it has wrought. The team is attached to it, the driver mounts his seat, and as he circuits round the standing grain, as if by magic the rich laden sheaves fall to the ground ready to be garnered into stack or barn to await the improved thresher.

The progressive changes have come also to our wives and daughters, as the products of the swift flying needle and shuttle found in every household will attest. I might mention railroad, telegraph, and telephone, and various other devices that conduce to comfort, convenience, and profit. Thus we are rapidly advancing and developing our resources, etc.

That we may better understand this rapid development, let me read from Com. Loring's address before the National Grange, assembled at Washington, at its last session:

"The rapid growth of agriculture, and of every other industry in this country, during the last twenty-five years, has filled the world with astonishment. In agriculture especially the growth has been very surprising, and accounts for that vast domestic and foreign commerce, out of which has grown so much of our financial success. Taking the single decade between 1870 and 1880, we may learn what can be accomplished in that period of time by a people constantly increasing in numbers and occupying new lands. In 1870 the amount of cotton produced was 4,352,000 bales; in 1880, more than 6,000,000 bales. In 1870 the amount of Indian corn raised was 760,000,000 bushels, and in 1880, 1,754,000,000 bushels. In 1870 the wheat grown was 287,745,000 bushels, and in 1880, 459,667,000 bushels. In 1870 the oats produced amounted to 232,000,000 bushels, and in 1880, 407,859,000 bushels. The increase in agricultural products was 100 per cent. in ten years; and from 1870 to 1880, in addition to this vast increase, our cattle export rose from \$13,000,000 to \$14,000,000; corn export from \$43,000,000 to \$50,000,000; wheat from \$167,000,000 to \$190,000,000; flour from \$35,000,000 to \$45,000,000; cotton from \$209,852,000 to \$245,534,000; beef from \$7,000,000 to \$12,000,000; lard from \$28,000,000 to \$35,000,000; and the growth of manufactures in that time was equally astonishing."

Fellow-farmers, I extend to you, and all, congratulations in living in this wonderful period of time—this grand epoch of the age. All occupations and vocations in life are made easier, and hence more pleasant, by these changes. Truly the lines have fallen to us in pleasant places; we have a goodly heritage. Brother farmers, our occupation is among the most honorable. Let us strive

to make it more so by being industrious and persevering, honest and intelligent, in the work we have to do. Socrates says: "Agriculture is an employment the most worthy the application of man; the most ancient, and the most suitable to his nature; it is the common nurse for all persons in every age and condition in life. It is the source of health, strength, plenty, and riches, and of a thousand sober delights and honest pleasures. It is the mistress and school of sobriety, temperance, justice, and religion; and in short of all virtues." And now, Gentlemen Professors from the Agricultural College, I congratulate *you* in the grand and noble work you are doing, in thus educating, and thereby elevating, those engaged in this pleasant and profitable calling. I also bid you a hearty welcome to this our Institute, hoping it may be a pleasant and profitable occasion for all interested. I close with these beautiful lines:

"Would you be strong, go follow up the plow;
Would you be thoughtful, study field and flower,
Would you be wise, take on yourself a vow
To go to school in Nature's sunny bower.
Fly from the city—nothing there can charm—
Seek wisdom, strength, and virtue on the farm."

EATON RAPIDS INSTITUTE.

This Institute was held in Red Ribbon Hall, January 24 and 25. In a report by one of the local papers it is spoken of thus:

"In spite of the unfavorable weather the State Farmers' Institute held in this place last week was a decided success, and the papers, as a whole, were more than usually interesting. The attendance would undoubtedly have been much larger had the weather not been so excessively cold. But we are inclined to think that even as cold as it was more farmers might have attended.

"These institutes are of such general importance and interest to every farmer that it ought to take almost unendurable cold weather to keep them away.

The programme was carried out as previously arranged. Rev. D. P. Breed offered prayer and was followed by Rev. J. R. Stevenson, who in a few well timed and appropriate words delivered the address of welcome."

The programme was as follows:

THURSDAY, JAN. 24, 1:30 P. M.

Music.

Prayer—Rev. D. P. Breed.

Welcome Address—Rev. J. R. Stevenson.

Reproduction in Domestic Animals—Prof. E. A. A. Grange.

Fine Wool Sheep—A. Crawford.

Drainage—S. H. Rorabeck.

EVENING SESSION.

Music.

Some Deficiencies in Country Schools—Prof. E. L. Briggs.

Occupations Open to Women—Mrs. Orr Schurtz.

American Roadsters—Prof. A. J. MacEwan.

FRIDAY MORNING SESSION.

Music.

Prayer—Rev. W. I. Cogshall.

Essay—A. F. Wood.

Value of Improved Breeds of Stock—Will E. Hale.

Women's Labor—Mrs. R. E. Atwood.

AFTERNOON SESSION.

Music.

Grasses—Prof. W. J. Beal.

What Shall We Read?—Miss N. B. Wood.

Mixed Husbandry—A. D. Saxton.

T. H. LYON, *President*.

O. B. LAKE, *Secretary*.

At the close of the Institute, the following resolutions were adopted :

Resolved, That we heartily endorse the action of the convention at Chicago, called by Hon. George B. Loring, Commissioner of Agriculture, to take into consideration the most practical method of securing speedily decisive legislation to prevent the spread of contagious diseases among our domestic animals, and we hereby request our Senators and Representatives in Congress to aid in any consistent way to secure such legislation.

Resolved, That the people of Eaton county hereby acknowledge the great services that the State Board of Agriculture has conferred upon us by appointing the institute just closed; and

Resolved, That the thanks of this community are hereby tendered to Professors Beal, McEwan, Grange, and Johnson, of the State Agricultural College, and our friends from outside of our county, for their very successful efforts in making this institute a success.

Resolved, That thanks also be returned to those who have furnished us such excellent music; also to those who have added interest as well as entertainment at this meeting by their essays and discussions.

GRAND RAPIDS INSTITUTE.

This institute was held January 28th and 29th, at the Farmers' Club Rooms, No. 14 Lyon Street. Prayer was offered by Rev. Mr. Sayler of Alpine, and officers were selected as follows: S. L. Fuller, President; E. G. D. Holden and J. W. Best, Vice Presidents; F. M. Carroll and C. W. Garfield, Secretaries.

The following programme was carried out, with the exception of Prof. Grange's lecture. On account of illness the Professor was unable to be present and Prof. Johnson lectured instead. Subject: Stock Feeding for Profit.

JANUARY 28,—EVENING SESSION.

Institute will open with prayer by Rev. Mr. Sayler, of Alpine.

Choosing officers.

Object of the meeting and its rules, stated by the chairman.

Address by W. O. Hughart, Esq., President of the Grand Rapids & Indiana Railroad, on "Relations of Railroads to Farmers."

Discussions and Questions, led by I. C. Davis, of the Township of Paris.

Address by Hon. Henry Fralick, on "Our Fairs and how to Improve them."

Discussion and questions, led by Hon. C. W. Garfield, of Grand Rapids.

JANUARY 29—MORNING SESSION.

Address on "Bees and Bee Culture," by Hon. A. B. Cheney, of Sparta, illustrated by an exhibition of honey-comb foundation, hives, etc.

Discussion and questions, led by T. M. Cobb, of Grand Rapids, and C. C. Hildreth, of Grandville.

Address by Prof. W. J. Beal, of the State Agricultural College, on "Grasses," illustrated by numerous varieties.

Discussion and questions, by Mrs. Sarah Smith, of Walker.

An address on "The Relation of the Farmer to the District School," by Mrs. W. T. Adams, of Paris Township.

Discussion and questions by Mrs. Helen S. Wilson, of Walker, followed by Mrs. A. V. Weatherwax, of Jennisonville.

Lunch.

Social meeting in Farmers' Club Room.

AFTERNOON SESSION.

Address on "The Examination of Horses with Reference to Soundness," illustrated with diagrams and a living horse upon the platform, by Professor E. A. A. Grange, of the State Agricultural College.

Discussion and questions by Ed. B. Dikeman, of Grand Rapids.

An address on "High Breeding of Horses," by John M. Mathewson, of Lowell.

Discussion and questions by Smith Thorington, of Grand Rapids.

Adjournment to dispose of the fragments left from the noon lunch, and for more social intercourse.

EVENING SESSION.

An address on "The Law of the Farm," by Judge Isaac H. Parish, of Grand Rapids. Discussion and questions, led by E. A. Burlingame, of Grand Rapids.

An address on "Manure for the Farm," with chemical experiments and samples, by Professor R. C. Kedzie, of the Agricultural College.

Discussion and questions by A. A. Wilson, of Grand Rapids.

At the close of the institute the following resolutions were adopted:

Resolved, That the thanks of attendants upon the first State institute at Grand Rapids be extended to the professors of the agricultural college, who have so ably instructed us in the addresses and discussions.

Resolved, That our thanks are hereby extended to Mr. D. P. Clay for his generosity in affording so pleasant a place of meeting and so convenient arrangements for the sessions.

Resolved, That our thanks be extended to S. L. Fuller, our able chairman, and his associates upon the committee of arrangements, who have arranged so pleasantly for the successful sessions of the institute.

CARO INSTITUTE.

The Institute at Caro, Tuscola county, was held in the court-house. Although the evening was dark and drizzly, and the sleighing mostly gone, a very good audience was present at the opening of the meeting.

After prayer by Rev. J. H. Reddick, and music by a quartette choir under the direction of Wm. R. E. Cookingham, Mr. A. C. Young, who presided, gave the following opening address:

LADIES AND GENTLEMEN, We have met here to-night for the purpose of holding a Farmers' Institute, the machinery for the accomplishment of which seems to be reasonably complete. There are with us men of learning, who

are familiar with the science of agriculture, and well schooled in the sciences, who bring with them well demonstrated theories, who will explain the results of scientific experiments in agriculture which the college library, laboratory, and mechanical appliances at their command have made it possible for them to carry forward and complete.

I also notice in this audience many men who are proficient in agriculture, who have spent years upon the farm and have a large practical experience, whose surroundings indicate that they have brought thought, judgment, and good sound common sense as well as developed muscle into the management of the farm.

The subjects brought before this Institute are open for your discussion. You are all earnestly invited to participate, and I hope we shall in any event free ourselves of the restraint that we are so apt to feel, and engage in a free and full discussion and interchange of views upon the many interesting subjects that will come before us. This meeting can but be one of the most profitable gatherings of farmers ever held in this county. These Farmers' Institutes have been held under the management and control of the State Board of Agriculture since 1875, and it is believed have resulted in great good to the communities in which they have been held. Very much useful knowledge has been disseminated, and earnest inquiry aroused which have gone far to demonstrate theory and establish facts.

By far too many farmers keep no books or accounts, and hence never really known whether they are making money or losing it; many more make a pretense of keeping an account of the year's receipts and expenses—which is much better than keeping none—but still is not as thorough and satisfactory in its results as the careful, prudent farmer should desire. Look at the merchant, for example; his books are so accurately kept that at the end of the year he knows exactly how he stands; he knows just what class of goods has paid him a profit, and just what have not, as well as those that will pay him best to handle for another season; his expense account, including clerk hire, lights, fuel, rents, insurance, etc., etc., every item has been carefully kept; his bills payable and bills receivable, and his stock invoice, and all embodied in a system of book-keeping so admirably correct, that at a glance he can ascertain the exact condition of his business. Fancy a merchant doing a successful business and keeping no books; the commercial agencies of the country would soon report him as a swindler, or else in such a deplorable mental condition that his own interests would require the appointment of a guardian to look after his affairs. While this policy on the part of the merchant would be so considered, yet the majority, I fear, of the farmers of this county are guilty of the same kind of lunacy in their neglect to keep strict account of the transactions on the farm. Too many farmers go right on season after season raising certain crops that may or may not pay them; a general lumping of the receipts, and a haphazard guess at the expenditures for the year, may show that they have made some money, or rather, more properly putting it, that they have gone through a year's hard work and have something left to show for it. Had a separate account been kept with the different crops raised, the fact would have doubtless been disclosed that the losses on some one of them had materially reduced the profits which the labor and capital invested should demand. An item of expense on the farm and one nearly always overlooked is the cost of hand and team labor. Suppose a crop requires, besides the cost of manuring, nearly all of the time of hand and team to attend to it; this is an

item of expense, an important one, too, that must be charged against this crop in order to determine whether or not it is a paying one.

There are so many avenues of loss that the most careful and systematic reckoning should be kept, in order to avoid mistakes in management and errors in calculation in time to prevent the serious consequences which so often result from their being overlooked.

Of course, in keeping strict account of all the transactions of the farm, much difficulty will often be experienced in determining to just what account certain items should be credited or charged. But after a time practice and experience will enable one to reach an approximate correctness of detail which will prove quite satisfactory, and productive of far better results than the old way of keeping no account at all, and my advice would be to you to try it one year at least.

It is undeniably true that the energetic, driving farmer, who follows the business in view of making money, leads a busy life, for it necessarily involves an outlay of much hard labor and energy of mind. With this fact in view and the numerous trials and perplexities which always occur to the farmer during very busy seasons, and the fact that the hardest and most important work of the year comes during hot weather when labor and exertion is most unpleasant, and when those who follow other callings have comparative leisure, it is not surprising that many farmers become discontented and sometimes almost discouraged. A certain amount of discontent seems to be a law of human nature; people of all callings look with envy upon those who follow other kinds of business, and however well a person may be situated, he is likely to imagine that others have a better lot in life. It is not surprising then to find farmers looking enviously upon lawyers, merchants, bankers, or those who follow other callings which demand less exertion of the body. But there is a bright side to farming which every farmer ought to recognize, and which more than balances its unpleasant features, while it is true that much farm work is laborious and unpleasant. It is also true that farmers may enjoy ample time for rest and without financial loss. The work of the farm requires more muscular exertion than that of the shop or desk, but it is less confining and far more healthy.

The speaker then referred to many noted men who had begun life on the farm.

The clerk, book-keeper, and merchant works more hours in the day, and are more closely confined than the average farm hand whose work is in the pure open air, and who has his evenings to himself.

The winter months, with their long evenings, afford to the farmer comparative leisure and ample time for recreation, amusement, and intellectual culture. They afford opportunity for reading and study, and for laying plans for future work and improvements.

The luscious fruits, fresh vegetables, pure rich milk and golden butter, which are looked upon by the wealthy residents of cities as luxuries, come to the farmer directly from nature and at little expense, the same articles are bought by city people at extravagant prices. After they have lost their freshness and most desirable qualities it is unfortunate that farmers do not, as a rule, better appreciate nature's gifts. The farmer deals directly with nature, and the blessings which he should appreciate and enjoy more than counteract the difficulties and disappointments which fall in his pathway.

There is no reason why farmers may not lead happy lives. Ambition, if

carried too far, becomes a misfortune and excludes contentment and enjoyment. But with a name to live and enjoy, rather than to accumulate fortunes, there is no calling better adapted to comfort, contentment, and real happiness than agriculture.

The remainder of the first evening session was occupied by Prof. E. J. MacEwan, who gave a lecture on "The American farm horse," and Prof. Cook, who read a paper on "Insecticides."

THURSDAY FORENOON.

Paper by Mr. A. H. Danielson—Poultry.

"Horse Racing at Agricultural Fairs," by Mr. P. C. Purdy.

"Farm Drainage," by F. F. Rogers.

AFTERNOON SESSION.

"Legislation Wanted by the Farmer," by Mr. C. R. Selden.

"Sheep Desirable Stock on the Farm," by R. S. Weaver.

"Practical Physiology," by Prof. A. J. Cook.

"Life on the Farm," by Mr. M. D. Orr.

EVENING SESSION.

"Manufacture of Sugar from Sorghum," by Hon. Enos Goodrich.

"Losses and Imperfections on the Farm," by Hon. E. B. Hayes.

An Address on the "Agricultural College," by R. G. Baird.

Before the programme for the institute was printed, Dr. Wm. Johnson, of Vassar, consented to read a paper on "Blooded Stock," but a short time before the institute was held the doctor was called to his eternal home.

President A. C. Young before the meeting closed, in a very appropriate and touching manner, spoke of Dr. Johnson as a citizen respected and beloved by all for his many excellent and manly qualities and of his death as a great loss to the community.

After a vote of thanks to the State Board of Agriculture for appointing an institute at Caro and to the Professors and others who had participated in the exercises, the meeting was declared adjourned.

All spoke of this institute as one of the best they had ever attended. Much of this was due to Mr. A. C. Young, who was untiring in his efforts to make it a success. The genial and large-hearted hospitality of this gentleman and his lady to the delegation from the College will not soon be forgotten.

LECTURES AND ESSAYS READ AT FARMERS' INSTITUTES.

MANURES FOR THE FARM.

BY R. C. KEDZIE.

[An Essay read at the Farmers' Institute at Berrien Centre, January 15, 1884, and at Grand Rapids, January 29, 1884.]

Manure is not a mere incident of farming. It is not simply an accumulation of filthy materials to be carried away somewhere and disposed of somehow. It is, on the other hand, a fact of first importance, and when we attempt to compute its value, the result is surprising. Take this estimate of the most highly developed agricultural nation on the earth. Sec. Russell, of Massachusetts, in a recent Agricultural Convention in Lowell, made the following statement: "Much has been said of the extent of the commerce of England, with its flags dotting every sea, but the entire value of all her shipping is not equal to the value of the manure applied to her land in any single year."

An adequate supply of manure is a prime factor in successful agriculture—the dung-heap is the pivot of high farming. I am not here to urge the farmers of Kent county to use manure, to save manure, or to avail themselves of any convenient supply of manure. The intelligence of this audience forbids such a discussion. But the conditions of farming in this region have greatly changed in consequence of the advance in the price of lands, the price of farm lands in Kent county having increased ten-fold within fifty years. This increase in market value necessitates a corresponding increase of rental value, and this rent, in addition to the cost of production, must be subtracted from the cash receipts before the question of profit can be considered. When we add to this the fact that the productive capacity of the land has fallen off in consequence of continuous cropping, we see that what was successful farming thirty years ago would lead to bankruptcy to-day. The price of land and the rental value are now so great that we can no longer afford to follow the easy slipshod farming of our early history, when a moderate crop gave satisfactory returns for the small labor bestowed, the rental value being of no account. Our agriculture must take on a more *intensive* character, and we must have large crops or no profits. Small crops don't pay.

A farmer was asked to contribute to a benevolent enterprise, but excused himself on the ground that his wheat crop that year was below the average—not more than ten or twelve bushels to the acre. "What do you call an average crop?" "Twenty to twenty-five." "How often do you have an

average crop?" "Very seldom, not oftener than once in ten years." We must have an average crop oftener than once in ten years, and this average must be a large one.

We have plenty of cheap nags that will trot a mile in ten minutes, but it is the horse that trots a mile in two and a fraction that brings the extra price, and the smaller the time the greater the price. It is the farmer that regularly produces five bushels an acre more than his neighbors who is on the road to wealth. The soil, like the ten-minute nag, is capable of producing moderate results without exhaustion, but the soil that produces extraordinary crops must have unusual natural powers, or be handled with uncommon skill and be sustained by high feeding. This uncommon skill is the keen intelligence of the farmer, and the high feeding is manure.

OBJECT OF MANURES.

A few weeks ago I received a letter from Sec. Garfield, asking me to read a paper before the State Horticultural Society on the subject of manures, in which he said: "I have been wishing some time that you would give us some advice on the manure question; for in watching the proceedings of the various local societies, there seems to be less of settled purpose in the use of fertilizers than in anything else connected with the management of orcharding. Fruit-growers keep very little stock, and thus manufacture a very small proportion of the manure they should use. It is grave question where to get the remainder. They buy salt, lime, ashes, stable manure made up mostly of shavings; dig marl, clay, muck; and still there seems very little of definiteness in their views of the comparative value of any of these. Quite recently, a good many have been dabbling in commercial manures. There is a general questioning upon these matters, and I think you could do us a deal of good if you are willing, with all you have on your hands, to lend us a hand."

I think if some David should "number the people" on this manure question, that quite a number of farmers would be found in the same condition of uncertainty. The chief office of manures is to furnish assimilable salts and combined nitrogen for the immediate use of growing crops, and thus supplement the natural food supply existing in the soil.

THE IDENTITY OF PLANT-FOOD.

It was long supposed that the food of such a variety of plants, and of such different properties as are found in different parts of the world, must necessarily be different—almost as different as the properties of the several plants. But chemistry has shown that the food of all plants is very much alike, though certain classes of plants must be supplied with certain substances in greater abundance than others.

There are only thirteen elemental substances concerned in plant-growth, and I will call your attention to some of the properties of these, and then speak of their relations to agriculture.

I. *Gases.* Four are gases when in their uncombined state. Here is this yellow gas, chlorine, which has such a strong affinity for certain metals that when their powder is sifted into the gas it takes fire at ordinary temperature. On account of its strong affinity for other substances chlorine is never found in the free state in nature, but in combination with sodium it is found in large quantities as common salt.

The other three gases all look alike, but they are very different in their properties. One is very combustible, and burns with a nearly colorless but

very hot flame, and when it burns it combines with the oxygen of the air and forms water, and hence called hydrogen. The oxygen does not burn, but very intensely supports combustion, for a splinter with a live spark will burst into flame when plunged into oxygen. The other gas neither burns nor supports combustion, and appears to be the laziest fellow in nature. This is nitrogen and constitutes four-fifths of the volume of the air, the other fifth being oxygen. Nitrogen is very abundant in the air, but in this form is entirely useless for the plant, because plants cannot assimilate free nitrogen.

II. Four are nonmetallic solids. Carbon is familiar to you all in charcoal, and when you remember that all vegetable substances char or carbonize when heated away from air, you recognize the fact that carbon exists in them all. Silicon is a material resembling carbon in properties, but forms the basis of sand. Sulphur is familiar to you all as brimstone. Phosphorus is a waxy solid, and is the easily ignited substance in most friction matches. It burns very easily, and when plunged into oxygen burns with great splendor.

III. Five are metals; iron, with which are all familiar; potassium, the silvery metal which is the basis of potash, and has such affinity for oxygen that it takes fire when thrown into water. Sodium is a white metal resembling potassium, and is the basis of soda, common salt, etc. Calcium is a light metal, in color resembling gold. It is the basis of lime, the lime being the oxide, or rust, of calcium. Magnesium is a silvery white metal, which you see in the form of wire before you. It is the basis of magnesia. The metal burns with great splendor, and forms magnesia, the oxide of magnesium.

You will understand that none of these substances exist in the separate or elementary form in the plants, but in various forms of combination these thirteen substances make up the whole of vegetable and animal substances—the baker's dozen make up the *chemicals of life*.

Small as is the number of these *chemicals of agriculture*, some are furnished by the free hand of nature in such quantity that the farmer need take no thought about their artificial supply. In the form of carbonic acid, carbon is contained in the air in sufficient quantity to supply any crop, since there are twenty-eight tons of carbonic acid in the air resting on every acre of the earth's surface. The carbon is literally "as free as air."

The *oxygen* and *hydrogen* are furnished in exhaustless quantity, and in just the right proportions in water. One necessary physical condition of plant-life is a supply of water, and in its presence the chemical conditions of growth, so far as oxygen and hydrogen are concerned, are fully met. If the "early and the latter rains" are denied, and the heavens withhold the benediction of the sky, then "Bashan languisheth, and Carmel, and the flower of Lebanon."

Sodium and Chlorine form common salt. The quantity required for most crops is small, and a sufficient supply is usually found in the soil-water of our State. The special uses of salt I will bring to your attention hereafter.

Silicon is the basis of sand, and is a constituent of every rock except limestone. Even the purest clay is a silicate of alumina. The soil supply of silicon for all plants is inexhaustible, and all plants have the power of supplying themselves with the necessary amount of silicon from the soil.

Oxide of Iron is the chief coloring substance in our soils, and but for this oxide and the organic matter of the soil, nearly all our soils would be white as snow. The quantity of iron required in plant growth is exceedingly small, and the soil supply is greatly in excess of the wants of agricultural plants.

Calcium and Magnesium are the metallic bases of lime and magnesia. In the form of carbonates they are found in most soils in sufficient quantity to

meet the requirements of all plants, so far as ash constituents are concerned. When lime is used as a manure it is usually for some other purpose than to directly supply the lime needed in plants, and I will speak of the special uses of lime in another place. All our soils contain a small amount of sulphate of calcium or plaster, which supplies *sulphur* to plants, though a few classes of plants require an extra supply beyond what the soil contains.

THE TRIPOD OF AGRICULTURE.

We thus see that of the thirteen chemicals of agriculture, Nature has provided some in exhaustless abundance, and others so liberally that the toilers of the soil need feel little anxiety, so far as the direct food of plants is concerned. Ten are thus summarily disposed of. But the case is far different with the remaining three, namely, *potassium*, *phosphorus*, and *nitrogen*. These most costly and precious substances constitute the golden tripod of agriculture. Plant life never unfolds a greenback, except upon the substantial banking basis of these chemicals of agriculture. They are the specie basis of Nature's greenbacks. Not only are they indispensable for all growth, but their limited supply correspondingly limits all the other conditions of growth. In manurial value they hold front rank. To accumulate in the soil and present to the plant in active form these three substances, are the essential chemical conditions of extraordinary cropping. With a sufficient supply of these three substances in soils of ordinary composition, there is no limit to production save those imposed by the physical conditions of growth.

MANURE.

Manure is any substance added to the soil to increase its fertility by changing its chemical composition, or by affording an increased supply of plant-food.

Some writers seem to regard manure as the crude material to be manufactured into crops by the machinery of the plant, just as wool and cotton are made into cloth by the factory. They seem to regard the soil as a passive agent in this process—useful merely as the receptacle to hold the manurial materials for the plant. But the soil is something more than the platter to hold the plant's dinner. So far from being the mere dish to hold the food, the *soil is itself the roast beef*—the principal dish of the meal—while the manures we use with profit are merely the salt and mustard to make the roast beef palatable and digestible. To make this clear let us count the cost of a crop on the theory of the passive condition of the soil. Let us estimate the cost of the crude materials to make a ton of clover hay if they were bought in separate form and at market rates. A ton of clover hay contains

39 lbs. potash (K_2O) @ 5c.....	\$1 95
11 lbs. phosphoric acid (P_2O_5) @ $12\frac{1}{2}$ c.....	1 38
44½ lbs nitrogen @ 20c.....	8 90
Cost of materials.....	<hr/> \$12 23

This would be the cost, saying nothing about labor and rent. It is evident that the soil itself must furnish the body of the feast or we shall go hungry. The nutritive power of the soil and the great diversity of soils in this respect are factors of prime importance in discussing the subject of manures, and serve in part to explain the discordance of results reached by different experimenters with the same manures but on different soils. We shall not go far

astray in our discussions if we regard manures mainly as the means used to make more effective the plant-food existing in the soil. In strong, rich soils the supply of plant-food may be sufficient for the wants of the crop, and the addition of manure may show no increase, but in poor and exhausted lands, if the physical condition is good, the most striking results are exhibited.

The prices I have given for potassium, phosphorus, and nitrogen to make a ton of clover hay, when purchased in commercial form, will afford food for thought in regard to the relative economy of barn-yard and commercial manures. I will again call your attention to this point when I speak of red clover.

Why do I attach so great importance to potassium, phosphorus, and nitrogen in agriculture? For three reasons.

I. In the absence of any one of these, no growth is possible. The Germans have a maxim, "No phosphorus, no life." But the same holds true of potassium and nitrogen.

II. A limited supply of any of these limits correspondingly the action of all the other chemicals of agriculture, however great their abundance. Even the elaboration of the carbon compounds depends upon the presence and coöperation of these three. They are the fates that spin the thread of existence for all forms of life.

III. They are sparingly doled out by the hand of nature, and are soonest exhausted by cropping. An exhausted field is one that will not produce a paying crop, and such exhaustion consists in the absence of one or all of these three materials in available form.

MANURES MAY BE COMPLETE OR PARTIAL.

A *complete manure* is one that furnishes all the substances which enter into plant growth. The best example is barn-yard manure. Animal excrements have been recognized from earliest times as powerfully promoting plant growth, and increasing fruitfulness. In the parable of the barren fig-tree the remedy was to "dig about it and dung it." Dung was the only manure known to the ancients, and while this word occurs twenty-two times in the Bible, the word manure is not found at all.

The value of barn-yard manure will vary with the kind of food, the variety and condition of the animal, and mode of preservation. I need not consume time to discuss these questions before a crowd of practical farmers. Whether a farmer keeps much stock or little, the chief difficulty is to get enough of this barn-yard manure. Of its value there is no question.

One way of increasing the quantity without seriously impairing the quality of barn-yard manure, I will bring to your notice. In most parts of the State there are muck beds easy of access. If barn-yard manure is composted with an equal volume of powdered muck by placing these materials in alternate layers, and then "turning the compost," by the shovel or scraper, once in the spring, a month before it goes to the field, you will have double the volume of manure, scarcely inferior to well rotted barn-yard manure. Such composting is not a process of dilution or watering, but a substantial addition of manurial matter. Muck contains nearly the same quantity of combined nitrogen (2 per cent) as well rotted manure, but this nitrogen is mostly in the inert or inactive form. By composting with barn-yard manure the active fermentation of the animalized matter induces fermentation of the muck, and some of the inert nitrogen is made active, any ammonia set free in the fermenting manure will be absorbed by the muck, and loss by leaching of the soluble

salts will also be prevented. Prof. Gulley tried this method at the college, and stoutly affirmed that he got as active manure and twice the quantity by composting with muck.

When we come to look closely into the value of barn-yard manure, we find that we are looking for potassium, phosphorus, and nitrogen after all. A brief consideration of the composition of barn-yard manure will make this plain. The portion of fodder that is not eaten, but only serves for litter, is obviously of the same composition as the plant as it came from the field, and contains all the materials for forming another similar plant. That which was eaten and completely digested still retains all its manurial powers unimpaired, so far as relates to the requirements of plant life. Digestion in its final result simply strips from food the most of the carbon, oxygen, and hydrogen, while all the other chemicals of Agriculture reappear undiminished in the animal excrements in a more active form. We may say the material has been boiled down by losing the starch, sugar, gum, fats, etc. Thus even in the complex material lumped off as barn-yard manure we are still in search of our golden trio, and the manurial question resolves itself into this, where shall we obtain in available form, in greatest quantity and at least cost, our potassium, phosphorus, and nitrogen. On these points hang all the law and profits of agriculture.

GREEN MANURING.

Another complete manure is found in the fresh vegetable matter of green manuring. In this method the whole vegetable growth is returned to the soil, and in a condition to insure rapid decomposition. In no other way can a soil in poor condition be brought into good condition so rapidly and by so little expenditure of money. By its skillful use the light and shifting sands of Belgium have been made the most fruitful fields of Europe.

A prejudice has arisen against green manuring which finds this expression: "Green manuring gives back to the soil only what it has taken from the soil; to take something from the soil, and to give back the same thing, cannot increase the fertility of such soil."

There is in most soils a large store of reserve material for plant food which is in the inactive because insoluble form, but which may be made active by any process by which it is made soluble. This may be accomplished by the naked fallow, the frequent stirring of the soil, promoting chemical decomposition of these inert materials. But there are other and more rapid means. Certain plants have a singular power of corroding these insoluble minerals by the action of their roots, bringing these minerals into soluble form and using them to build up their tissues. When such plants are plowed under the soil they may give back to the soil only what they took from it, and yet add greatly to its fertility, because they have transferred such minerals from the retired to the active list.

But it is not true that plants give back to the soil only what they have taken from it. All plants take carbon from the air, and green manuring is the easiest way to increase the store of humus in the soil.

Certain classes of plants also have a singular power of accumulating combined nitrogen. Where they get the whole of this combined nitrogen is at present a mystery, but the fact that certain classes of plants do acquire a large store of nitrogen where other classes of plants fail to secure such supply is unquestionable. When these plants, rich in nitrogen, are plowed under the soil, they give to the soil in active form something which they did not take

from the soil in this form. They thus accumulate in the soil assimilable nitrogen—the most precious and costly element of vegetable growth.

A variety of plants may be used for green manuring. In this State, red clover justly heads the list. The reasons for this are not hard to find. Clover sends its roots deeply into the subsoil to draw up the hidden minerals of plant growth, and beyond all plants grown in this climate it has the power of accumulating combined nitrogen. Let us count up the market value, at commercial rates, of the manurial materials in an acre of clover. An acre of fair clover will produce two tons of hay and a ton of aftermath or fall feed; the sod contains as much matter as the hay, the scythe leaving as much behind as it removes. The stubble and roots will weigh as much, and is as valuable for manure as the crop of hay. The acre of good clover will therefore have the equivalent of five tons of vegetable matter, containing 195 pounds potash, worth \$11.75, 55 pounds phosphoric acid, worth \$6.88, and 222½ pounds of nitrogen, worth \$44.50, or a total value of \$63.13 at current commercial rates. Do you wonder that I call red clover the red-plumed commander-in-chief of the manurial forces?

Here is the result in dollars and cents if you have to buy the materials in open market. How the farmer shall treat this crop, whether he shall plow it under as green manure, or feed it to his stock and return the manure to the land, is a matter of indifference to the chemist, because the manurial value in either case will be the same, provided there is no loss in keeping or handling. In either case you will note the great manurial value of the clover sod, which is about \$25.

If for any reason clover cannot be used for the manurial crop, then other crops may take its place, foremost among which I would rank the field pea, to be plowed under after the hogs have eaten the peas. The cow pea of the south will be of great value if it will stand our climate. In general terms I would say, grow any crop that will produce the largest amount of organic matter, giving preference to those plants which are richest in combined nitrogen.

To those who encounter difficulty in their efforts to find, make, or buy enough manure for the farm, I again urge this subject of green manures. It is the cheapest and quickest way to renovate exhausted lands. These plants are the gleaners of the soil to collect the elements of plant food. They take up a collection every day to gather from the reluctant minerals of the soil every particle that can be persuaded to enter the active list. You know something of the teasing importunity of a collection—that the little box hung up in the vestibule with its admonitory card, “Remember the poor,” is a nullity beside the pushing contribution box that goes into every pew and nudges the elbow of every sleepy or negligent sitter. Let the living plant carry the contribution box to every part of your soil to at last pour its accumulated wealth into the mouth of your hungry fields.

INCOMPLETE MANURES.

The number of incomplete manures, which furnish only a part of the chemicals of agriculture, is much larger than the number of complete manures. I shall not attempt a complete discussion of these special manures, and only call your attention to those that may be obtained in our State and are worthy of your consideration.

I. *Animal remains* of every kind—flesh, blood, skin and bones—are very rich in manurial matters, and should all be made to contribute in the grand levy of

life. The man that drags his dead horse or cow off into the woods there to rot and pollute the air of the neighborhood, or teach the dogs the easy lesson of helping themselves to a free lunch, whether of dead cow or living sheep, is a fool. If these animal remains are composted with muck, no offensive odors are given off, and a large amount of very valuable and inoffensive manure is made. Here is a specimen of dead horse and muck entirely odorless.

Animal remains are valuable because they are so rich in combined nitrogen, and because they decay so rapidly that they benefit the crop speedily. But even those which decay slowly, such as hair, leather, woollens, etc., may be made available and active by composting with wood ashes slightly moistened, and valuable manure secured. Any waste material that gives off the smell of burnt feathers during combustion should not be burned up, but converted into manure for the nitrogen they contain.

Bones of all animals have a high manurial value because so rich in nitrogen. Dry bones contain on an average one-third their weight of organic matter, and two-thirds mineral matter. The organic matter contains about eighteen per cent of nitrogen, and the mineral matter contains eighty per cent of phosphate of lime. If we allow the bones to contain in their natural state one-third their weight of water and fat, and compute the value of the remainder at commercial rates for nitrogen and phosphoric acid, we shall find that a ton of bones is worth \$16 for nitrogen and \$16.83 for the phosphoric acid, or \$32.83 a ton for ordinary bones. If perfectly dry, the value will be proportionately increased to make up for our allowance of water.

Bones act slowly in the soil because they decay slowly in consequence of their compact structure. They are liable to be brought to the surface of the soil by the plow and cultivator. If they are ground into a bone meal, like the specimen before you, they easily incorporate with the soil and act promptly as a manure. They can readily be ground in a bone or plaster mill.

If no mill is at hand, the fresh bones may be reduced to a fine state by composting them with twice their bulk of wood ashes, slightly wetting the ashes so that the potash may act on the organic matter of the bones; shovel over the pile once a month, for three months, when the bones will readily crush under a blow of the shovel and may readily be beaten to a soft mass. If the organic matter has been removed, by boiling, for glue, the ashes will have no effect upon them, and the value of such bones for manure is reduced by the withdrawal of the nitrogenous matter.

SUPERPHOSPHATE.

Bones can rapidly be brought into the active condition by the action of sulphuric acid, making sulphate and superphosphate of lime, like the sample before you, but it will not pay the farmer to make his own superphosphate because the acid will cost so much. The manufacturer can make his own acid for \$5 a ton, while you cannot buy the acid for less than \$40 a ton. It is better and cheaper to buy superphosphate ready made, when you can get of the Michigan Carbon Works, in Detroit, this bone black, dissolved in acid, containing 16 per cent of soluble phosphoric acid, for \$35 a ton, and the Homestead Fertilizer for \$40 a ton. For giving crops an early and vigorous start in the spring I regard superphosphate valuable. Its effect varies with the soil and season.

NEED OF A PUBLIC ANALYST.

Before you can safely buy commercial fertilizers you need some guarantee

of their purity and value. In other states no commercial fertilizers are allowed to be put on the market before they have been analyzed and their value certified by an officer of the law, but nothing of the kind is required in this State. While some excellent commercial fertilizers are in our market, yet the fact that parties in Ohio within a few months past tried to secure agents in Michigan to sell a "superphosphate" which was *nothing but bog lime or marl*, shows that some protection is needed. Here is some of this Buckeye superphosphate.

WOOD ASHES.

Among the most common and most valuable of special manures I place wood ashes. The composition of ashes varies somewhat according to the kind of wood from which they are obtained; but we may safely take the ash of the body of the beech tree to represent the average composition of wood ashes. Wood ashes contain all the required elements of plant nutrition, except nitrogen. In 100 pounds of wood ashes there are 16 pounds of potash, worth 80 cents; $3\frac{1}{2}$ pounds soda, 2 cents; 67 pounds lime and magnesia, 8 cents; $5\frac{1}{4}$ pounds phosphoric acid, 26 cents: total, \$1.16. If we had to buy in market in the cheapest form the manurial materials contained in 100 pounds wood ashes, it would cost \$1.16. Can you afford to throw away such valuable materials, or to sell them for sixpence a bushel to the soap-boiler? No argument is needed; here is the value, and there is the selling price. Draw your own conclusions.

Even when ashes have been leached and washed to the last degree they still have value because the phosphates and carbonates of lime and magnesia still remain and are worth 34 cents a hundred, or \$6.80 per ton of leached ashes. These materials are insoluble and permanent.

The market gardeners of Long Island knew the value of leached ashes, and sent ships 1,000 miles to bring the leached ashes of Maine to New York, even when the ashes had to be hauled many miles before reaching the ship.

But I will not consume time to tell how they do things down east, but instead will give you my experience with leached ashes in Eaton county. More than thirty years ago I settled in Vermontville and bought a home lot, or as I told my wife, "I fenced in $2\frac{1}{2}$ acres of Paradise." The soil was a stiff boulder clay, and had been exhausted by a rotation consisting of wheat stubble followed by wheat. I planted it all to fruit. I kept a cow and three horses, for in that thinly settled section long rides and short fees were the rule for a country doctor. I had plenty of stable manure and used it freely. But I soon found that the excess of stable manure gave my pears the fire blight, made my apple trees run to water-sprouts and suckers, and my grapes ran wild in wildwood. I then turned my attention to a pile of leached ashes near by, and had 75 to 80 tons of these ashes scattered over my field. No more fire-blight or water-sprouts, but golden fruit in bountiful supply.

Like my ever-so-great-grandfather Adam, after a time I left my paradise, which finally came into the possession of Mrs. B., in exchange for a 160-acre farm. Some years ago her son told me that she received more money from the sale of fruit from that $2\frac{1}{2}$ acre orchard than she had received from the 160 acre farm. I wandered through the place a few weeks ago and found the soil had not forgotten the liberal dose of leached ashes applied more than twenty-five years ago.

I do not want to "make a corner" in ashes, but if you can get any—even if they have been leached and washed for fifty years—by drawing them five

miles, apply them liberally to any soil, but especially if your soil is open and porous. There is little danger of an overdose, and it is not a material that will wash out of the soil.

PLASTER.

No single manurial substance is more characteristic of American agriculture than plaster. It has been applied to every kind of crop and on every kind of soil. It never does harm and often shows striking benefits. It is the source of sulphur for plants, and is a more available source of lime for plants than the carbonate, because it is somewhat soluble in water. On grasses, such as June grass, red-top, and timothy, it has little influence. Applied to grain crops it increases the growth of leaf and fibre without increasing the amount of grain. On leguminous crops, especially red clover, it has a marvelous influence, increasing the growth of the entire plant, and increasing the amount of nitrogenous material beyond what the plant would have contained not dressed with plaster. The clover hay made with use of plaster is worth more, ton for ton, than clover hay not plastered during growth. The two pillars of the porch of the temple of Michigan agriculture are *Plaster and Clover*. No other combination holds out richer promise of good to the farmers of the peninsular State.

Lime holds the first rank in British manuring. The peculiar climate of the British Islands—cool and moist, free from climatic extremes, and with a strong tendency to the accumulation of peaty matter, and tardy decomposition of vegetable matter, calls for the strong disintegrating influence of lime, and it is used there with a lavish hand.

In this state the high price of lime prevents its extensive use as manure. When lime costs a dollar a barrel, and ten to twenty barrels per acre are required to produce its full effects, a farmer is apt to count the cost before ordering the lime. Caustic lime shows the greatest benefit on mucky soils, and by its use they are soonest brought into cultivable condition. Muck is usually acid, and in this condition is incapable of successful cultivation. A good dose of quick lime destroys the acid condition, tends to dissipate the excess of vegetable matter, and soon brings the remainder into active condition. Caustic lime also acts upon the compound silicates of the soil, setting free a portion of their potash for the use of plants.

The mild or carbonated lime is found most abundantly and in the cheapest form in leached ashes and marl. I am often asked to give an opinion about the value and use of marl. Marl is a somewhat variable mixture of the carbonates of lime and magnesia, with sand and clay. It is often found at the bottom of muck beds and shallow lakes, is a grayish white material, and when vinegar or any acid is poured upon it, it foams up or effervesces from escape of carbonic acid. You can readily determine its value by finding how much is soluble in acids, since the inert materials (clay and sand) are insoluble in ordinary acids. Dry a quantity of the marl, and weigh out 100 grains; place this in a bowl and pour over it an ounce of muriatic acid diluted with water. When all action has ceased pour off the clear liquid, wash the remainder with water two or three times, dry the residue and weigh again. The loss in weight will give you the per cent. of valuable materials in your marl.

Common salt has come into more common use for manure of late years, but it deserves more attention than it has yet received. It is valuable in itself because it contains two of the chemicals of agriculture, Sodium and Chlorine.

It is valuable indirectly for setting free the inactive ammonia held by humus, the oxide of iron and other materials in the soil; also by making soluble the potash and phosphate of lime in the soil. It has a marked influence on light porous soils, rich in humus, and in fair condition, while it is almost entirely useless on cold, wet clays.

Salt shows marked benefit in the growth of asparagus, cabbage, and mangolds. It prevents scab in potatoes, increases the growth of leaf and fibre in grasses, and increases the palatability and digestibility of the hay produced, and promotes the health of stock. It often prevents the lodging of grain, but exhibits little influence on clover, presenting a strong contrast with plaster in many of these respects.

In looking over this manure question it seems to me that there are three questions for the farmer to consider:

I. What are the materials we seek in manure?

II. Where can they be found in greatest abundance, in available forms, and at least expense?

III. How can we make best use of those materials when found?

I have tried to open the door for a profitable discussion of these three questions which lie at the basis of successful farming.

DISCUSSION.

Mr. Bennett asked if coal ashes were of any value as manure. Dr. Kedzie replied that they were of no value.

In answer to several questions concerning muck, its treatment and its value as a manure, the Doctor stated that vegetation is forced on a drained swamp by using lime, then manure.

Sour muck is found beneath the surface, and by exposure, and especially by freezing, it loses its sourness.

Muck consisting principally of woody fiber is worthless. But good muck made up of vegetable mold may be hauled three miles, when dried, and used as manure with profit.

As regards the amount of green manure to plow under, he said: When the ground is kept wet and a large amount of green manure plowed under, active fermentation *may* set in. But it *rarely* happens that *too much* green manure is plowed under.

Soils consisting largely of carbonate of lime probably lack nitrogen or phosphorus, or both, and needs ashes, barn-yard manure, or phosphates.

In answering Mr. Bennett's question as to the value of bone meal, he said: Bone meal, as we get it from the glue factory, is worth, as manure, about \$16 per ton. Before the glue is extracted it is worth twice as much.

Several questions were asked about wood ashes as manure, to which Dr. Kedzie replied, that wood ashes are more valuable than farmers are apt to think, and especially in fruit culture. He did not advise composting ashes with barn-yard manure, as the ashes liberate ammonia. Ashes of hard wood generally contain more potash.

In response to Mr. Robinson, he said that dried blood would greatly increase the yield of strawberries if sowed between the rows in the spring.

FARM DRAINAGE.

BY FRANK F. ROGERS.

(Read at Caro Institute.)

How to secure an abundant supply of water at places where it is most needed, and how to get rid of too great a supply where it is not only not needed but a positive injury, have long been troublesome questions. So much capital, however, has usually been at command for the water supply that great skill came to its aid, and now almost every city and large town points with pride to its elaborate system of water works. The latter is not usually considered a question of life and death, but merely a question of profit and loss. But were the vast number now in untimely graves because of imperfectly drained homes commanded to stand forth, we should have facts that would convince the most stubborn that they had much better pay surveyors and ditchers than doctors and undertakers. Yet men persist in their old ways, and when malaria strikes down a near friend they call it mysterious providence and think no more.

Drainage is an old subject. To attempt anything like a history of the art would be entirely out of place in a short paper, where the more practical parts should be discussed. I think it better to submit to a little tediousness, and speak more in detail of the real work than to attempt a literary paper whose only merit could be to please. Drainage in all its branches is a wonderful subject. We may appreciate enough better its work on the farm to pay for a slight glance at its magnitude. Water in its various forms, it is safe to say, is the worst enemy of the engineer. It hinders his work more than all other evils combined. It breaks over his levees and sweeps barren great areas of country. It trickles down gently and unobserved till the most stable structure is undermined and overthrown. It is the one troublesome element of that most troublesome substance, quicksand. Surely it can be as truly said of water as of fire, "It is a good servant but a bad master." It is fast carrying the soil from the mountains to the valleys, from the valleys to the ocean, and is silently but surely at work for the literal fulfillment of the prophecy when "every valley shall be filled and every mountain and hill be brought low."

The removal of surplus water from the farm may seem a more trifling subject yet few of us really appreciate its importance. While land is comparatively cheap, because unimproved, natural drained lands are readily accessible, the thorough drainage of large tracts will rarely occur. But the time is fast approaching when the subject of farm drainage will claim our most earnest attention.

As our land, for the most part, is above the water level of surrounding lakes and streams, the gravity method is all we need to consider, viz.: to construct suitable conduits or drains, through which the surplus water, whether on the surface or in the soil, shall find its way to the nearest point where it will be no longer troublesome. This being true, to discuss the most effectual, durable, and economical methods of constructing these drains will be the object of this paper.

There are only two methods by which this may be done. 1st, by open ditches of various forms; 2d, by covered drains, for which tiles only should be used.

In some places it might seem that open ditches are hardly worth our attention, but no one acquainted with the present needs of the Huron peninsula will think the time has yet arrived when open ditches can be dispensed with. Farmers can not yet afford to pay for tiles large enough to take their places and open ditches must ever demand a good deal of attention to be kept as suitable outlets for the network of tile drains which, sooner or later, must be the crowning effort in making every acre of land to produce valuable crops.

In all drains no parts need more careful attention than the outlets. Then let us in a general way consider the final outlets of our drains. The whole peninsula is flat and the streams for the most part sluggish. Black river has places (and I am told it is true of the Cass) where the fall is considerable, and were it dredged out or cleaned in some way so as to make the stream deeper and free from obstructions, it would have a fair current the entire length and we should have secured the first requisite of any ditch depending on this stream for an outlet. As it now is, marshes near the stream are so near the water level that thorough drainage is utterly impossible. In Wheatland township, Sanilac county, I took levels on a drain, where a stake forty-four rods west of Black river was lower than the stake at the proposed outlet, and less than two and one-half feet above the river bed. About a mile beyond, on the same drain, after passing a slight ridge of gravel and clay, there is another marsh about seven feet above the first, and nearly level in itself. Beyond this, less than a mile, is another about three feet higher than the last, and in itself about level. Thus it goes, till the highest point of the water-shed, between Black and Cass rivers, is reached. The two latter marshes can readily be drained onto the former, but acres of land along the river will be made wetter instead of drier by such a ditch. I mention this because I think it a typical case, not only on the Black river but on the Cass and other streams, and shows forcibly the need of improving these natural outlets. This is not farm drainage, but it is the first requisite, and the power lies with the farmers to see that this improvement is made when they want it sufficiently bad.

In laying out open ditches to drain these marshes, many things should be considered that are quite often overlooked. First, find the cause of the marsh. Is a direct fall of rain and snow compelled to remain there till evaporated? Is it flooded by visible streams? By surface water from adjacent hills? Is it fed by springs? Or, as is likely to be the case, some two or more of these causes combined. Should the water come from adjacent highlands, either from the surface or as springs, do not open a big ditch through the centre as is often done, but rather keep near the highland with a ditch on each side, and arrest the water as soon as it strikes the marsh. If it is fed by visible streams, conduct them away in the most direct manner possible. The direction of the drains will best be determined by taking a few preliminary levels. That simple precaution will often save many dollars. The eye is a poor guide.

If the ditch is to be cut from a swamp through a ridge of clay or gravel, care must be taken to cut deep enough on the ridge to allow for settling of the marsh after it becomes drier. Many ditches in Michigan are of little value because of this oversight. The hard land will not settle and the result is a level ditch or one with the fall the wrong way: either of which is bad enough.

COMMON FAULTS OF OPEN DITCHES.

These are many. It is commonly thought that to construct a good open ditch all that is needed is a good muscular man with a shovel. True, he may do very good work if he has running water to guide his depth and will take the necessary precaution. This is not often done, however, for most open ditches seem to be made more on the plan to hold water than to get rid of it. If the ditch is of any considerable length it will be found economical to avoid this by securing the services of a competent surveyor or engineer, who can take levels on the line, establish a grade line for the bottom, give the depth at each station, and determine the size necessary from the area of country to be drained. Drains are nearly always laid out too shallow, to save the first expense, made with too many angles, while the sides are almost universally cut too steep.

TILE DRAINS.

However perfect the open drains may be made, where anything like a thorough system of drainage is adopted, tile drains must constitute the chief features of the system. These, unlike the open drains, will usually be constructed by individual efforts, and the cost must be kept low enough to make the investment profitable.

The first thing here, the same as for open drains, should be the preliminary survey. This need not be expensive and may consist merely of the random levels to determine the most suitable location, and then the levels along the line of drain. For this the farmer had better secure the services of a competent engineer, if his work is very extensive. This cost at most will be a small per cent of the entire cost of the drain, and if properly done will save double or treble the cost of locating on the final work of construction. The "*go at it by guess*" method so much in vogue by us Yankees is sometimes very expensive. Every part of a tile drain should be executed in the most workmanlike manner. When done it should be done for a life-time. One author very mildly says "A blunder in draining, like the blunder of a physician, may be soon concealed by the grass that grows over it, but can never be corrected." There are many devices for getting lines of levels, that on short drains may profitably be used by the farmer, but if the amount of draining is great they will never pay.

We will now suppose this work all accurately done, the stakes set every fifty feet with hub and the cut marked on each stake, and the number of the station. Begin digging at the outlet. Cut as narrow as possible at the top, just giving room to work to the required depth, making the bottom only wide enough for the tile. When nearly at the required depth, the following arrangement will be found excellent for finishing to an accurate grade. (Showed model of the apparatus used at the College; may be seen in the report of 1877, page 228.)

The size of tile to be used should be determined from the number of acres to be drained, and the amount of fall that can be secured. Tables may be procured that will enable any one to do this with very little figuring. I find by referring to such tables that for thorough drainage a 2-inch tile will drain 2.1 acres; a 3-inch tile, 5.7 acres; a 4-inch tile, 8.2 acres; a 6-inch tile, 22.8 acres; a 10-inch tile, 83.9 acres; a 12-inch tile, 132.5 acres. Prof. Carpenter, of the Agricultural College, says that for ordinary farm drainage these numbers may be safe doubled, making a 2-inch tile drain 4.2 acres; a 4-inch

tile, 16.4 acres, etc. It should always be borne in mind that the capacity of tiles increases as the square of their diameter. Thus a 6-inch tile will carry four times as much water as a 3-inch tile. It really increases a little faster than that, because of less friction, for a given volume of water in the larger tiles.

The best tiles are round. All should be hard burned. Round tiles can be laid with better joints, as they can be turned in any position, and when the ditch is properly scooped out with a round schoop, there is no difficulty in keeping them in place. All drainage engineers, so far as I know, recommend round tiles. Joints may be covered with turf—grass side next the tiles—gravel, tan-bark, or bands of tarred paper.

The cost of drains will vary with the cost of tiles and price of labor, so will be quite different in different sections. Counting labor at \$1.00 per day, and tiles at \$10.00 per 1000, Mr. French, the author of a standard work on drainage, says that a tile drain four feet deep can be made for 50 cents per rod. That estimate is too low, both for tiles and labor, to be strictly accurate in this section.

Most tile drains are made shallower than is recommended by those who have given the subject a thorough study. They should at least be placed below frost, and as the object is to lower the water table in the ground, four feet is generally considered the best average depth. This, of course, will be varied somewhat with the comparative cost of labor and tiles, and the kind of outlet that can be secured. If tiles are cheap and labor dear they might be placed a little shallower. It should be remembered that it costs about as much to dig the last foot of a four foot ditch as it does to dig the other three.

If the system contains many branches, it will be found convenient in caring for the drains, and also lessen the liability of their becoming clogged, to build a few silt basins. These should be built at the junctions of the laterals with the mains, especially if the fall is much less in the mains. Several laterals may flow into one silt basin and have but one outlet. The outlet should be 3 to 6 inches lower than the inflowing pipe, and the basin be 8 to 12 inches deeper than the discharge pipe, to make room for the deposition of silt, which may be removed from time to time. Though very long mains are not often advisable, as few outlets as possible should be made, and these should be strong and durable. The Agricultural College has built several such outlets very cheaply. They consist merely of a small wall of stone, laid in mortar, placed deep enough to prevent heaving by frost, and extending two or three feet each side of the last tile, which is built firmly in the wall. If the drain is of sufficient importance, an iron pipe may be substituted for the last tile. Some kind of screen for the outlet is useful to prevent vermin from entering the tile. Many ways of doing this will suggest themselves to a thoughtful farmer. The outlet should always be several inches above the water in the main channel.

After the drains are completed in this thorough manner, the farmer should have a permanent record of them in the form of a map. This should show the location of each drain, the length, and the points where all the branches unite with the mains, with reference to some permanent marks. The farmer will be surprised to find how much help such a map is when he wishes to refer to any drain or add a new one to the system.

GRASSES.

BY PROF. W. J. BEAL.

(Delivered at Eaton Rapids and Grand Rapids Institutes.)

In an introductory address to the medical students of Harvard university a few years ago Dr. O. W. Holmes said that doctors had been using the common elder as a remedy for 2,000 years, and had just found out that it possessed no medicinal value whatever. We are reminded of the statement of Dr. Holmes in the following: Mr. I. Worlidge, in 1681, speaks of rye grass as having precedence of all other grasses. This is the first mention made of rye-grass in cultivation. It has been much cultivated ever since that time, especially in Great Britain and Ireland, and even to the present day it is given in nearly every list by most seedsmen, but some of the best observers and experimenters no longer recommend it. They think they have found out that it is not enduring in permanent pasture; that it flourishes for a time, taking the cream of the soil, then disappears, leaving vacancies for weeds to fill. It is not easy, after rye-grass dies out, to induce other good grasses to flourish.

Even in Great Britain, where most attention has been given to grasses, as late as 1882 one of the best of Englishmen, Mr. De Laune, says: "The grossest ignorance prevails about grasses."

Farmers in this country bestow much less attention to grass lands than to most other crops. Not one farmer in ten thousand can give any name or tell much about three-fourths of the grasses growing on his farm, and yet all of them acknowledge that grass is a very important crop and that there is much difference in their value.

The grasses commonly sown in the Northern States are timothy, red top, and red clover, the latter of which is not a grass. Once in a while we find a farmer who sows orchard grass, June grass, meadow foxtail, and perhaps a few others. Almost any neighborhood contains fifty or more species, native or introduced. We have a vast country, with every variety of soil and climate, and yet make use of half a dozen species of grasses out of a total number of about 3,200.

In some of the best agricultural reports of other states considerable attention is given to discussing the grasses, but a careful reader cannot rid himself of the opinion that many of those persons hardly know what they are talking about.

THE REASON WHY, AND A REMEDY.

Why are the grasses not better known? Farmers have tenaciously held to old practices in regard to the grasses used, and their treatment. New ones have often been recommended, perhaps by selfish men. Seed has been ordered, but whether it was true to name or whether it ever grew or not, the farmer never knew. He returned to the old varieties which he did know. The grasses for a beginner are very difficult to recognize in their various stages of growth and in various soils and climates. They look much alike until they have been carefully compared.

How can the farmers procure good seed true to name? The difficulties have been pointed out, and many now begin to think that there are other grasses worth trying, that there may be something better for certain purposes than

any now in common use. The leading seedsmen keep giving advice, but they are interested in making sales.

The Royal Agricultural Society employs a consulting botanist to examine samples of seeds offered in market. He has small fees for performing certain work. Seedsmen of England are now advertising to guarantee seeds in accordance with the standard fixed by the consulting botanist. This has given the farmers confidence, and has nearly or quite put a stop to "doctoring" seeds. If railroads find it necessary to employ engineers, if trustees think it best to employ a landscape gardener to lay out a park or a cemetery, if builders employ architects, why should not the farmers, at a trifling expense to each, employ a consulting botanist? Farmers think nothing of employing a surveyor to lay out their farm, grade a road or stick the stakes for a ditch or a tile drain. There is a botanist attached to the boards of agriculture in several of the States. In no way could such an official make himself more useful than by testing the seeds sold to farmers in his State. Some States already have experiment stations, and this is one of the kinds of work they can do for the farmers. A similar work is already done in case of commercial fertilizers in Connecticut, New Jersey, North Carolina, and Ohio. Other States are following. This is beneficial to both the seller and the buyer. More fertilizers are sold, because the standard is guaranteed. So it would be with grass seeds.

In this country but very little care is bestowed on meadows or pastures. No crop gets less attention; none would respond more quickly to good care.

Who ever heard of a premium crop of grass?

By pasturing early and late the tops are kept closely cut down to the ground. The roots are weakened and much injured, and require a long time to recover. To gain and thrive a grass needs some green leaves as much as a horse needs fresh air and a stomach to digest a liberal supply of food. Pasture should not be allowed to grow very tall and go to flower.

With reference to the pastures of Maine, Professor Stockbridge would advise as the corner stone to put the improvement in the head of the farmer himself, then all else will follow.

It has been repeatedly shown that a judicious mixture of several varieties will produce a larger yield than can be obtained where one variety is sown by itself. This is a rule in nature as well as in farming. Many sorts will usually occupy the ground more completely than one sort, and help keep out the weeds. "Every species has some special niche to fill." Animals have their likes and dislikes. A grass may be thrifty, but not very nutritious. It may be native to the country where it grows, but this is no sign that it thrives better than would a foreign grass. As an illustration, we have only to think of the success of some of our worst weeds, most of which are foreigners.

There is no one model grass—a general-purpose grass—any more than there is one best kind of horse, sheep, cattle, wheat, corn, potato, or apple. What do you want it for? After this is answered, any one with the requisite knowledge can make a selection.

Some grasses start too slowly in spring, or they are too sensitive to frost or drought, the stems are too woody, the leaves too thin, the tops too short, the aftermath is of no account, or the herbage is bitter or innutritious. Is the grass needed for one year? Then the seeds must be rather large and germinate quickly, and soon produce thrifty plants. It is to the advantage of a grass if it seed freely, if the seeds are large and healthy.

The success of grasses depends very much on the supply of moisture. Liberal spring rains, with mild weather, make a thrifty growth in meadow or

pasture. For some of the northwestern country a grass must root very deeply to endure dry weather for months. It must sometimes endure freezing with bare ground, with the mercury down to 40° or 50° below zero, or endure a burning sun, with the mercury at 100° or more in the shade. It must not be killed by fire in dry weather. In the south it must stand much heat, much moisture, much drought.

For alternate husbandry a grass must not be hard to kill, like quick grass.

With a large area of meadow land, it is often convenient to have different sorts of grasses, that they may not all be fit to cut at the same time, thus prolonging the season of haying. For a meadow they should mature about the same time. For pasture the time of flowering, or of most rapid growth, should vary and extend from early spring till late autumn, or in the south it should extend over a good portion of the year.

M. Goetz found out what grasses were best adapted to his soils by a slow process of testing each separately; then he used a mixture of the seeds of those species which he had found did the best.

In England, thirty-nine species or more of true grasses are recommended for use by some one. Besides these, twenty-one species of clover, or other plants, are on lists for pastures or meadows, making about sixty species or varieties in all, a single mixture often containing twenty or more kinds.

Moisture makes the meadow. A free and correct distribution of moisture will make good pasture, even on soils of inferior quality. Pastures on poor soils in Wales and Ireland will improve under treatment that would be quite insufficient on the eastern coast of England.

In a recent admirable essay by C. L. F. DeLaune in the "Journal of the Royal Agricultural Society" for 1882, he names the five following coarse grasses as most valuable for permanent pasture:

Dactylis glomerata—Orchard grass.

Festuca pratensis—Meadow fescue.

Festuca elatior—Tall fescue.

Phleum pratense—Timothy.

Alopecurus pratensis—Meadow foxtail.

He says these five should form the bulk of all good pastures on good soil, either for sheep or cattle. The most valuable finer grasses, in his opinion, are:

Cynosurus cristatus—Crested dogstail.

Festuca duriuscula—Hard fescue.

Poa trivialis—Rough meadow grass.

Agrostis stolonifera—Fiorin.

Festuca ovina—Sheep's fescue.

Avena flavescens—Golden oat grass.

In much smaller proportion he would use permanent red clover, or cow grass, alsike, and white clover. He would always put in some yarrow. "All rye grasses, or nearly all, die out after once seeding." He omits sweet vernal altogether.

What is best for each of the various portions of the United States probably no one yet knows. We are trying to find out. For the moister portions of the north the above-named list seems to be a good one, with, probably, this modification: Place *poa pratensis*, June grass or Kentucky blue grass, in place of *poa trivialis*, and *agrostis vulgaris*, red top, in place of *agrostis stolonifera*, and for the drier portions of our country, to the coarser grasses add *arrhenatherum avenaceum*, tall oat grass.

We will not puzzle our farmers with numerous long lists of mixtures at a mere guess, but give a few of the best and advise experimenting each for himself. A great point is gained when a farmer ventures to deviate from the usages of his father or neighbors. Many have fallen into certain practices, often without very substantial reasons.

HOW MUCH SEED SHALL I SOW?

That depends on the size and vitality of the seeds, the number of seeds to the bushel, the condition of the land, whether distributed evenly, and the nature of the season which is to follow. No fixed rule will relieve the farmer from thinking for himself and employing all the good judgment at his command. In the opinion of the writer, it would be better, in most cases, if farmers used less seed to the acre and took more pains to get the land in better condition. Suppose we sow twelve quarts of timothy seed and four pounds of red clover to the acre. This will make 18,944,000 seeds of timothy and 6,024,000 seeds of clover, a total of 24,968,000 seeds, or about four seeds to the square inch. Using finer seeds in mixtures, as prescribed by some of the English dealers, they often sow from 50,000,000 to 100,000,000 seeds to the acre, or not far from eight to sixteen seeds to each square inch. In either case, there can be room for only a small portion of the plants, should all the seeds grow and thrive. Much caution must be used in applying the fixed rules laid down in books, or the fixed rules laid down by men who seldom consult the books.

To improve pastures buy cattle which have been started on some farm which you will never see; buy grain and feed to the cattle which run on the pasture; apply ashes, barn-yard manure, nitrate of soda, bone meal.

There is an incessant battle for life going on among the plants of a meadow or pasture. As wolves quarrel over a carcass, or hungry swine over an ear of corn, so plants struggle with each other to secure the greatest amount of food. Whether they be diatoms in the pool, fungi on the rotting apple, weeds by the wayside, or grasses in the meadow, one rule governs them all. Each strives for all it can get. Dean Herbert was more than half right. "Plants do not grow where they like best, but where other plants will let them." In the words of the *Agricultural Gazette*: "Grasses live in harmony on the old unmanured, open park, having nothing to fight for in a state of nature. Season after season the same plants appear in about the same proportions. But toss them a bone, ground fine, or any other choice bit, and their harmonious companionship terminates at once. Every art of improved cultivation occasions instant war. A grass likes the best that can be got. It will swallow soda, but not when it can get potash."

Baron J. B. Lawes and his associates at Rothamsted, St. Albans, England, at great labor made some prolonged and elaborate experiments, continued for more than 20 years. On an old meadow he tried and carefully watched the effects of some dozen kinds of manures. Here we have the most valuable experiments ever made on permanent grass land.

The manures which were the most effective with wheat, barley, or oats on arable land were also the most effective in bringing forward the meadow grasses. Again, those manures which were the most beneficial to beans or clover benefited most other species of leguminous plants. The grasses proper and the clovers with their allies require manure somewhat different. The changes were most marked where the most liberal manuring was employed.

By means of manures the yield of dry matter per acre was in several of the experiments considerably more than doubled. Every description of manure diminished the number of species and the frequency of weeds.

In the unmanured plats the miscellaneous herbage, including weeds, was 16 per cent, while on the manured plat they decreased to 2 per cent. Irrigation produces much the same effect as manures, though some weeds, like docks, are increased by irrigation. Manure and drainage improve the hay also by making it less woody, by increasing the amount of flesh-forming material, by increasing the albuminoids one-fourth, by raising the per cent of sugar from 10 to 15 per cent, by increasing the fatty and waxy matters. The good hay is the more succulent.

Good grasses are a "sign" of good land in good condition. Over our vast country with a great variety of soil and climate we cultivate only a few species of grasses. It has long seemed to some of these possessing the greatest foresight that we might profitably seek new grasses for new or old farms. Why not look for them in Patagonia, the valley of the La Plata, in Siberia or Russia, in South Africa or Australia, in Mexico or Japan? Because the grasses are so numerous and look so much alike to all except botanists, it is a good reason why the State or nation should assist agriculture in an undertaking which seems so fruitful of good results within a short time at so trifling expense. Here is a grand work for some rich philanthropic person or for some experiment station.

Prof. Beal urged every farmer who had not already done so, or at least some enterprising man in every township, to make a fair trial of meadow fescue, orchard grass and tall oat grass. Be sure you are not deceived. Purchase the seed on condition that it is pure, true to name and possesses good vitality after being examined by an expert.

Prof. Beal was asked the best mixture of grass seed for a marsh, and how much to sow to the acre? He replied that a mixture of fowl meadow grass, and red-top, sowed about two or three bushels to the acre, is the best, although blue-joint is good, and June grass is sometimes used.

The best time for cutting grass is just at, or a little before, the time of flowering.

Mr. Crawford stated that his experience was that early cut grass, though a little harder to cure, was much preferred by all kinds of live stock to hay made from grass cut later, and could be fed with more economy.

To the question, "what grasses are best for lawns?" Prof. Beal replied that June grass, with a little white clover, made by far the best lawn. Rhode Island bent grass is also good.

To kill quack grass he knew of one sure remedy. It was to kill it by thorough cultivation. Plow it under in the fall, and early in the spring cultivate and harrow every four days, not letting a green sprig appear.

Canada thistles may be choked out by red clover.

A sedge which springs from a bulb about the size of a pea, and which is exceedingly tenacious and troublesome on certain pieces of low ground, is best exterminated by thorough drainage.

Kentucky blue grass and our June grass are the same plant.

PEACH CULTURE.

BY J. B. DUMONT.

[Read at Otsego Institute.]

That there are larger profits in the cultivation of the peach than in any other crop, there can be no doubt, other things being equal. To raise peaches successfully requires a careful and judicious study of the most important things needful for the success of the undertaking. If you have not a high plat of ground, which will catch the prevailing winds, and which lies above the cold stratas of the atmosphere, or which is not naturally well drained, or which is naturally too heavily mixed with clay, do not plant a peach orchard; or if, having the right elevation and soils, you are not prepared to cultivate and manure as thoroughly as you would for wheat or any other crop, then do not plant an orchard; or, if you are prepared in both of these particulars, you cannot spend the time to dig out and eradicate the grub at the root of your trees, fall and spring, do not plant an orchard; or if, having all these, you cannot make the wants of your orchard, profiting by the experience and experiments of others, your constant study, do not plant an orchard. Because, if you plant on any but high and well ventilated ground, you will lose many of your trees by the severity of the winter, and what you have left will only yield you one or two crops in three or four years, by reason of severity of winter or spring frosts, or if your soil is too heavy and you can only plant a few varieties, such as the Crawfords, and therefore can not meet the wants of the peach market, or if not well drained, you can not grow peaches.

To grow a peach orchard you must give it, besides pruning, the same care and cultivation that you would a field of corn. If your land needs manure for corn, do not give it any less for peaches; and, while it may not be best, it is generally practiced to raise a crop of corn in a peach orchard the first two or three years, it being the least exhaustive of any crop. After this the peach crop will pay for all you may do for the orchard, and the more you do the better it will pay, if your orchard has been well cared for the first three years. Thorough mulching and proper fertilizing agents administered to the roots of the tree, to supply exhaustion, and the necessary cultivation between the rows to keep your orchard clean, will insure you a healthy, vigorous, profitable orchard. Of course, in connection with this, judicious and careful pruning is absolutely necessary.

For a good market orchard, I would set 5 Amsden's June, 5 Early Rivers, 5 Hale's Early, 5 Cooledge Favorite, 5 Early Crawford or Foster, 5 Richmond, 25 Old Mixon or Stump-the-world, 25 Jaques Rareripec, and 20 Late Crawfords, in every one hundred trees. This will give you an orchard that will be as well distributed through the season, and will give as good returns, as any other varieties, and give you as early a free-stone, Hale's Early, as is now known, without giving an excessive amount of clings, which are only valuable because of their earliness.

I have thus far spoken of the peach orchard as though there were no diseases to which the peach tree is liable. This is certainly not true, because of the prevalence of yellows or vegetable chlorosis; for me to attempt a description of this disease is entirely unnecessary at this time. Suffice it to say that this disease has been known in Michigan for nearly twenty years, and

nearly one hundred years in Pennsylvania and New Jersey, and that until quite recently the only known way to stay its ravages has been to dig up and destroy the diseased trees. This has been practiced with varying success for some years, until now it is a pretty well established fact that yellows will sweep out every peach tree in Michigan unless some other means can be discovered to arrest its spread. In the Genesee valley, New York, where the disease was not known fifty years ago, there is to-day hardly a bearing tree that has not yellows. There is hardly an orchard in New Jersey more than nine years old that is not abandoned because of yellows, and it is only a question of time when the orchards of Michigan will be swept away, with only our present knowledge of the disease. Of this I am so thoroughly convinced that I would not set another tree, if I did not think that some remedy, in the light of science, would yet be discovered to arrest its spread. I have always thought that the disease was due to exhaustion, instead of parasitic fungi, bacteria, or contagion; but the advocates of contagion or inoculation had so persistently talked it that I had become nearly persuaded from my belief. I have recently become more thoroughly grounded in the belief, by the experiments of Dr. Goessmann of Amherst, Mass., who is professor of chemistry in the Massachusetts Agricultural college, and who has for a number of years been experimenting with a view to finding an antidote for yellows, and for that purpose has analyzed the peach tree, both in health and in disease, and also healthy and diseased fruit. From these experiments he discovered that the disease was due to exhaustion and not to any fungus, as heretofore thought, and by applying to the soil, at the roots, of an orchard of 200 trees, the elements found to be wanting, he was not only enabled to keep the trees that were not diseased in a healthy state, but actually to restore trees that were diseased to their normal condition, which he proved to be true by a comparison of the diseased tree restored and that of trees in their normal state. Prof. D. P. Penhallow, botanist and chemist of the Houghton experimental farm, Lawson Valentine, proprietor, Mountainville, Orange county, N. Y., has arrived at the same conclusion from his microscopic examination in reference to the cellular contents of the wood of different trees, including the peach in health and disease. It seems to me that the true way to find out the cause of yellows is by scientific analysis of the diseased tree and its fruit, comparing the results with results of the same experiments with healthy trees and their fruit. Then, by supplying to the soil such things as are needful to restore or keep the diseased tree in a healthy condition, we can probably arrest the disease. When a physician is called to see a patient, his first thing to do is to find out what is wanting to restore the patient to a normal condition; or in other words, to supply the system with those things in which it is deficient. In this way, as long as the system is kept in this natural state, there is no danger of disease.

A well-regulated city's sanitary arrangements are worth thousands upon thousands more to its welfare than the services of its most eminent physicians; and just so in the case of an orchard—an ounce of prevention is worth a pound of cure. Supply to your orchard what is needful to keep it in health, and there is no danger of yellows. Unless this can be done I think there is very little use in any one, however favorable his location or soil, planting an orchard.

With this accomplished there are large profits in a peach orchard. Without it there is not, nor can there be, any profit. I have just commenced to experiment on three acres of orchard with a view to supplying it with the lacking

elements in the soil, and for this purpose I have applied to the roots of the trees four pounds per tree of a fertilizer compounded from the following formula: 4 per cent of sulphate of magnesia, 24 per cent of muriate of potash, and 72 per cent of black bone dust or dissolved bone black. This dose I design to repeat in the spring. On any trees that show yellows I will add three or four pounds of muriate of potash, this being the salt most deficient in a diseased tree. In the absence of this the tree becomes diseased by reason of its taking from the soil too large a percentage of lime to supply its natural wants, the same as an individual becomes diseased by means of taking into the stomach such food as is not calculated to sustain life and keep the system in a healthy condition. In other words, a starved tree will take from the soil anything in the reach of its roots, to sustain life for a time, the same as a starving man will eat dog if he can get nothing better.

There are many other things in connection with peach culture that might be spoken of, prominent among which is proper thinning of the fruit, as early in the season as you can be warranted in doing it. Of course the early varieties require least thinning, because the curculios destroy much more of these than of later varieties. As a general rule, peaches should not be allowed to grow more than four or five inches from each other, to give best results. Of course, the earlier this is done the larger and better will be the fruit. There are some varieties that require cultivation the same as corn, or they will not grow and mature, but it will not do to cultivate much after the first of August, because you will induce too late growth of wood, and thereby the tree will be too tender to stand the severities of winter.

Allowing the fertilizer above spoken of to cost twenty cents per tree per annum, and the cost of cultivation twenty cents more, you have an expense per tree per annum of forty cents. Then, allowing that you get a bushel per tree only once in two years, you still have a margin in favor of the peaches of twenty cents per tree once in two years, or twelve to fifteen dollars per acre per annum over and above cost. This is on the assumption that an orchard may be grown to three years old without cost, or, in other words, the cost of growing an orchard to three years old is compensated for in the crops grown with the orchard. Again, if a remedy can not be discovered for yellows, the certainty of your orchard being destroyed in from three to five years after it gets to bearing will not warrant any one in setting an orchard. Any person having a high plat of ground, of sandy or gravelly loam, where the mercury seldom goes more than 10 degrees below zero, may grow an orchard to three years of age with very little expense, assuming that the land is good enough to warrant you in planting corn with the trees. At this time, or the fourth season after planting your orchard, you may reasonably expect to get a bushel per tree, which will net you a half dollar per bushel; and if you plant 130 trees per acre, or about 18 feet apart, you have about \$65 per acre. Then, allowing that you put back \$15 of this in the form of a fertilizer to supply exhaustion and to prepare the tree for the next crop, you still have \$50 per acre for the use of your land. This you may reasonably expect to continue at least ten years, assuming that you can control yellows. If you plant an orchard on level, or a lower piece of land, of equally good qualities in all other respects, where the mercury is liable to go down to 20 degrees below zero, you will be likely to lose it from severity of the winters before it is seven years old, with the strong probability of not getting more than one crop of peaches in the whole time. With these things staring you in

the face, you will not, I think, be likely to plant an orchard on this kind of land and on this elevation. On the other hand, there are strong inducements to plant an orchard where everything is favorable.

DISCUSSION.

Mr. Loomis: Thirty-eight years ago I set the first peach tree where I live, with the intention only to raise peaches for my own use. I set out a few to commence with, then a few more next year, and so on, my neighbors doing the same, and now all available places are covered with peach trees and the peach trade has grown into a vast monopoly with us. One of the essentials in setting out an orchard is to select proper varieties. Some of the varieties are more liable to yellows than others, and should be discarded.

Prof. Cook: What are the varieties?

Mr. Loomis: The Barnard and Hill's Chili. In pruning and treating yellows, I agree with Mr. Dumont. The fertilizer is what we must look to as a preventive. I do not expect a remedy.

Mr. Blackman: Is a tree more liable to yellows set in the place where one having yellows has been removed?

Mr. Loomis: No; not with us. At Benton Harbor, I believe, they do not set a tree where one having yellows has been removed.

Mr. Blackman: Do you use a fertilizer in setting a new tree?

Mr. Loomis: No; it is not necessary.

Mr. Glidden; I rise to a point of order. Mr. Dumont should answer these questions if he can. If he can not, then it would be in order for some one else to answer them.

A voice: Mr. Dumont has taken the train for home and has been gone some time.

Mr. Gould: Is yellows contagious?

Mr. Loomis: Yes.

Mr. Corner: Have you ever detected anything that would lead you to think the roots of a tree having yellows were diseased?

Mr. Loomis: No.

Mr. Gould: I believe yellows is contagious; but I do not believe that one variety is more liable to take the disease than another. I do not believe that trees die of starvation. I have seen them in soil as rich as a barnyard and on new land, and had yellows.

Mr. Jewett: I have Barnards which have borne for years and are now perfectly healthy.

N. W. Lewis: I believe that soil and variety have nothing to do with the disease. I believe the root is diseased and ought to be removed; I believe the disease is contagious. I do not plant in the same place where a diseased tree has been removed until the second year.

Prof. Cook: What is your opinion as to clay, as given by Mr. Dumont?

Mr. Lewis: We must have drainage. The surface water must be taken off. Some figures as to profit and loss, on one and one-half acres set to peach trees: At three years old the fruit sold for \$134; at four years old for \$100; at five years old for \$200; at six years old for \$400. A crop on six acres sold for \$2,000.

Mr. Gould: I advise peach-growers not to try any experiments with yellows. If they do, they will certainly suffer. In Lawton, where I live, the yellows commissioners cut down all trees that the owners refuse to cut.

A voice: Is yellows known by the fruit or by the leaves?

Mr. Loomis: Both. I do not plow my orchard.

Mr. Fuss: How far apart ought peach trees to be set?

Mr. Gould: Sixteen feet each way.

SMALL FRUIT FOR THE FARM AND GARDEN.

BY W. A. SMITH.

[Read at Berrien Institute.]

Horticulture, as in the past, must be considered the acme of agriculture; but under the American system, it is more specific in its application. The term, as now used, is more particularly employed to designate the pomological department of husbandry, or the cultivation of the various fruits. Most, if not all our more valuable fruits are merely improved specimens of wild types found in nature. These improvements are brought about by various means; viz., by cultivation, selection, hybridization, etc.

In many warm countries, the native fruits of the soil supply both man and beast in great part with the necessities of life. It is well known that in tropical climates the human race requires but little animal food; while in the cold, frigid belts, animal food containing a large supply of carbon or fatty matter is indispensable. From these well known facts we can readily deduce a principle applicable to ourselves; viz., that in the hot summer months our systems require more vegetable acids and less carbon or heat producing food than in the cold winter season. Hence, during the warm season at least, we should have a bountiful supply of good ripe luscious fruit, both for economy and hygiene.

That small fruits have of late years become a necessity rather than a luxury, is plainly indicated by their enormous consumption in all our large towns and cities. Our city cousins have the advantage of us in this, that their season is much longer than ours. From early spring till late fall their market is bountifully supplied from near and far, while we must depend mainly upon our own short season for our supply. While we are confined to a short season of production, we have every other advantage. We can always have them in their perfect state of ripeness and freshness. While the consumption of small fruits in the cities is mainly by the middle or laboring classes, I am sorry to say there are yet thousands of well-to-do farmers throughout the country who deprive themselves and their families of these cheap and wholesome comforts. Surely if any class of people is entitled above any other to live on the cream and fat of the land it is the producing class, by whose toil and sweat the wealth of the world is produced. Not only should, and could, every husbandman in the land have an abundance of these necessary comforts of life in their season, but they should be preserved by drying or canning for use in the household during the balance of the year. I firmly believe that such a course would materially reduce the doctor bills by toning up the general health.

In this paper I shall aim to be practical and recommend for cultivation only such as are known to be meritorious in quality, hardiness, and productiveness; and but a limited number of these. And as this paper is intended particularly

for the farmer and not for the professional horticulturist, I trust I may be pardoned for stating plain simple facts. As the subject is a very comprehensive one I shall confine this paper to three or four of the different species or varieties of small fruits in general cultivation, and of the greatest value to the producer.

And first among these is the strawberry: a native of all or nearly all parts of the north temperate zone and of the mountains of South America. Ten or twelve distinct species have been described in their wild state, while the cultivated varieties which by careful selection, hybridizing (or crossing) and the sporting freaks of nature are counted by hundreds. The several species belong to the genus *fragaia* of the rose family.

Among the cultivated varieties are the Pistilates (having the female organ only while the stamen or fecundating male organ is wanting) and the perfect flowering. The latter are generally preferred because they are self fertilizing. The Virginian, or common wild strawberry, is found from the Arctic zone to the Gulf, and west to the Rocky Mountains. The Alpine strawberry is common in European countries and is also found in Oregon and our northwest coast, while the Chilian strawberry is found on our Pacific Coast from Oregon south. The Wood strawberry is a taller plant than the foregoing, and was cultivated in England and sold on the streets in London more than 400 years ago. The Indian strawberry from Upper India, has a showy yellow flower, but dry and tasteless fruit. The soil best adapted for the cultivation of this fruit, everything considered, is a deep rich sandy loam, with a clay subsoil, where natural drainage is good, or well underdrained with tile. The ground should be well cultivated the year before setting the plants and kept free from weeds and foul seeds. Healthy, vigorous young plants should be selected, and set as early in the spring as the ground is in good working condition.

If intended for horse cultivation the rows should not be less than three feet, and the plants eighteen inches apart in the row. In setting the plants draw a line and use a common narrow bladed spade; set the spade six or ten inches deep, open the space by a lateral movement of the handle, withdraw the spade and set the roots of the plant well in the ground, and pack firmly by hand. As soon as the plants are well established, the ground should be cultivated. The best results in this line require the blossom buds to be removed, or pinched off, the first year, and runners cut about once in ten days, thus enabling the plants to throw up strong, vigorous stools for the next year's crop. If the ground is exposed to strong, prevailing winds it should be covered with marsh hay, straw, or coarse litter during the winter, thus protecting the plants from the blighting winds, and the freezing and thawing of the ground. When the plants renew their growth in the spring the mulching should be removed from the rows so as to expose to the plants the warmth and light of the sun. When the fruiting season has closed, the mulching should be removed and the ground well worked. Now the runners may be allowed to make plants for future setting or fruiting.

In selecting varieties for home use, or even for market, none but the best should be planted. In this respect the Wilson stands preëminent for quality, firmness, and productiveness. The Cumberland Triumph, Sharpless, Manchester, and Jucunda are all good and reliable on favorable soil and good culture.

Next in the order of ripening, and quality, and importance of the fruit, is the raspberry; a fruit bearing shrub of the genus *rubus*, of the order *rosaceæ* or rose family. The genus *rubus* includes both the raspberry and blackberry.

In the case of the former the drupes cohere, and when ripe fall away from the woody or dry receptacle, being broad, flat, and cup shaped next the stem. There are many divisions of the raspberry family in their natural or wild state; but I shall confine this paper to two distinct varieties, the red and the black. The common wild red raspberry, from which doubtless all our improved sorts have originated, is found from Newfoundland to Oregon, and as far south as the Middle States. It is found growing wild in great profusion in the northern part of this State. It is not found wild in the south. The canes, of a light copper color, after the first year grow upright from two to four or five feet, mainly without laterals. The shrub is biennial in character, this year's growth of wood fruits next year and dies. It propagates freely by underground stems, which run out in every direction from the main plant a few inches below the surface, and from which numerous upright stems or canes are produced. These may be allowed to remain and mature their wood, and transplant the following season; or they may, when four to six inches high, be taken up and transplanted at once. For this purpose, the ground for which they are intended should be well prepared, deep, straight furrows drawn from six to eight feet apart, and when taken up should be immediately transferred to their new home. This should be done moreover, when the ground is quite damp, and during a cloudy or rainy day, when it will prove every way successful. For cultivating one way set the plants three by eight feet, for cultivating both ways six by six feet. This arrangement will apply equally well whether we set old or new wood. When the last year's wood is set the canes should be cut back to four inches of the ground; and after the first year the canes thinned out to five or six. Heading back may be deferred till the spring before fruiting, when all the canes stung the previous summer by the white cricket should be carefully cut out, collected, and burned.

Of this fruit there are many varieties contending for supremacy, but for home use, or even for market, under favorable circumstances, I know of none that for hardiness, productiveness, and fine quality is superior or even equal to the Turner. The Cuthbert and Brandywine are more firm but not equal in quality.

The black raspberry *rubus occidentalis*, sometimes called blackberry and thimbleberry, is in the wild state more widely distributed than the red, extending as far south as Georgia. The canes of most varieties are more prickly than the red, and the fruit spurs instead of starting from the axils of the main cane as in the red are mostly produced by the laterals. Its propagation is also different from the red. Instead of producing plants from underground stems, the plants are formed on the tips of the canes. The preparation of the soil, and the setting of the plants are mainly the same; only the black varieties require more room on account of the spreading habits of the shrub, and should have from eight to ten feet between the rows, and at least three feet in the row. Like the red, they should be set as early in spring as the ground is in good working condition. The first season they require only good culture, the same as corn or any other hoed crop. After the first year, when the growing canes are about two and one-half feet high, the tops should be pinched: this will induce a more rapid growth of laterals, from which the main crop of fruit is procured, also, plants for future setting. These laterals in growing re-curve, and finally reach the ground, and sometimes run along the surface for a yard or more, become enlarged at the tips, turn purple, and are then ready for the formation of roots or stools. In order to secure strong, well-stooled plants, the tips should then be put in the ground

from two to three inches deep. From three to five strong, vigorous canes are enough to the hill for fruiting. When vegetation starts in the spring, these laterals should be cut back to six or ten inches from the main stem, depending on the vigor of the bush. Both staking and wiring the raspberry and blackberry should be condemned, as expensive and injurious to the canes. The better way is to grow strong canes, well headed back, and they will always support themselves. Among the many varieties of this most excellent fruit in general cultivation, either for market or home use, I would select the Gregg. It contains about all the good qualities required. The Cluster and Tyler are also well recommended. For canning or drying for future use, or for table use, in its season, I doubt if we have any small fruit superior or equal to the black raspberry. None of our small fruits retain their richness of flavor in canning or drying better, or so well, as this; and the dried fruit always finds a ready market at good figures. For hygienic or dietic purposes, I consider this one of our most valuable of small fruits, and should have a place in every garden. It is perfectly hardy in this latitude, even during our most severe winters. There is, however, one difficulty in its propagation, and this is of a most serious character. It has been about as fatal to our black raspberry canes, as the yellows has been to our peach trees. On the Lake Shore it has literally wiped them out. We are now starting anew with better varieties, and I hope such as will resist a tendency to this blighting scourge—the rust—a fungus growth, manifesting itself in the iron rusty appearance of the leaves, and the thin, wiry forms of the canes. Neither the cause nor a remedy has as yet been discovered. This fungoid growth, like the mildew on the grape, is doubtless due in part to meteorological or atmospheric causes. The excessive wet season of 1883 developed an unusual amount of rust among our blackberries.

Next in order of ripening and importance of the *rubus* genus, is the blackberry; which, in the wild state, extends over the mountainous and temperate regions of the old and new world. Of these, we have in this country two characteristic varieties; the *rubus canadensis*, low blackberry or dewberry, with trailing, prickly stems running on the ground. This variety is little known except in its wild state. The other, the *rubus villosus* or high blackberry. Like the red but unlike the black raspberry, it reproduces by suckers. In all that pertains to the preparation of soil, the setting of plants, the cultivation thereafter, and the general management or treatment of the canes, the same system applies as in case of the black raspberry.

Owing to the large number of new varieties continually forced upon the market, it is difficult to recommend even a small list that will prove satisfactory in all cases. For quality, productiveness, and exemption from rust, the Lawton has no superior or equal. But there are seasons when the Lawton in this State, even on our high lands on the lake shore, winter-kills. On an average, about one year in two we succeed in getting a good crop of this berry without winter protection. Those who take the pains to lay their canes on the ground late in the fall, may reasonably hope for a crop about every year. The Snyder and Western Triumph on a good strong soil, and close pruning, may be relied upon to yield a fair crop every year without winter protection. For earliness, hardiness, productiveness, size, richness of color, and firmness, the Wilson is perhaps without a peer. It lacks, however, in quality, and is better adapted for market than for home use. The white cricket has of late years been propagating its species by stinging the black raspberry and blackberry canes; but not to the same extent that it works on the red. All these plants

when starting, while young and tender, like corn are subject to be preyed upon by the cut worm.

There is also another enemy of these plants that needs looking after. I am unable to name it. A small worm from one-half an inch to an inch in length. This worm is either bred in the cane, or finds a lodgment there while the cane is young and tender, eats out the pith, and the cane droops and dies. By splitting open the cane it can easily be found and destroyed. The only available remedy for the rust among raspberries and blackberries is to remove them as soon as possible, root and branch, to a convenient spot and burn them. If contagious, this may prevent the fungoid spores from spreading; if not, we are only removing what is utterly worthless.

On grape culture I wish to say but little. The subject is too comprehensive to mix up with any other. All I can here urge is for every farmer who has a spare rod of ground, and who has not even many, to set from one to fifty vines upon any well drained soil, whether it be sand loam, clay loam, or pure clay, no matter how hard. Prepare the soil well; in case of hard clay deep plowing and thorough pulverization is essential to a good beginning. Give them plenty of room; when one or two years old keep them well tied up to stakes or trellis, and when the season for pruning arrives go to some successful grape culturist for instructions, and you will get more practical information in one hour than you would be likely to get in any other way in a week. If this is not practicable go to work and cut the last year's wood back to one or two eyes, except where the greater part of the vine is required for fruiting. Leave only wood enough for a fair crop.

The Concord, for general culture, stands at the head of American grapes. For quality, we have none equal to the Delaware. For the grape rot a liberal application of fresh lime spread over the surface of the ground might have a tendency to arrest the disorder through atmospheric influence. For mildew, an application or two of two parts pulverized sulphur and one part fresh air-slacked lime, applied with a common hand bellows, just before going into bloom, and again later in the season if mildew appears, may prove both a remedy and preventive. Fumigating the vines with common roll brimstone might prove equally or more effective.

FRUIT FOR THE FARMER.

BY E. H. SCOTT.

[Prepared for the Chelsea Institute—not read.]

MR. PRESIDENT, LADIES AND GENTLEMEN,—In relation to health this topic is one of the greatest importance. There is nothing more conducive to good health than good ripe fruit.

For family use a succession of kinds of all fruits is desirable. The apple being most generally used and first in importance claims our first attention. I could name the following varieties as good for Southern Michigan: Early Harvest, Red Astrachan, Large Yellow Bough (commonly called Sweet Bough), Hawley, Gravenstein, Baldwin, R. I. Greening, Green Sweet, Red Canada,

and Jonathan. The last two on the list are better top-grafted on some other variety.

Apple trees should not be set nearer than thirty feet—forty would be better. Trees to do well should not be over three years old. I prefer two years in preference to older. Trim off all side branches and leave the stem not over three feet in height.

Low headed trees produce more fruit, which is much easier picked. Oh! but some say we cannot plow close to our trees if they are branched low. There is where a great deal of hurt is done to an orchard, plowing close and breaking large roots. Do not try to take too much from your land.

The first four or five years hoed crops can be raised if land is kept in good condition.

In peach trees the same trimming is necessary, but the trees should not be over one year old. About sixteen feet is the proper distance to set peach trees.

For varieties I would name Hale's Early, Mountain Rose, Early Crawford, Late Crawford, and Smock. This gives a succession of choice peaches. The first two are white fleshed, the balance yellow.

In quinces the Orange variety will be the most satisfactory. Quinces need more manure than either apples or peaches. Mulching with any course material will be found very beneficial.

FRUIT GARDEN.

Under this head comes grapes, currants, gooseberries, strawberries, raspberries, and blackberries, with which every farm should be bountifully supplied. Plant them all in long rows so cultivation can mostly be done by horse power.

Grapes—Under this head I would recommend Moore's Early, Concord, and Martha, the Martha being greenish white the others black. If convenient a trellis can be made along a fence, thus economizing space. Do not set vines too close together, not closer than eight feet.

In currants the Red Dutch and Fay's Prolific are the best.

For varieties of gooseberries Houghton's and Downing's will give the best satisfaction.

Strawberries should be planted in rows three and one-half to four feet apart and one foot in the row. The Wilson is the standard variety, although the Manchester, Mount Vernon, Sharpless, James Vick, etc. all do well.

Raspberries should be planted in rows five to six feet apart and about three feet in the row. When plants get about two feet high nip off the tops; this makes them throw out side branches, making them stocky and well balanced. Late in fall (when growth has stopped) or early spring cut back these laterals to one foot or eighteen inches according to strength of plant. For varieties the following are first class: Turner and Cuthbert for red, and Souhegan, Tyler, and Gregg for blackcaps.

Blackberries need the same treatment as raspberries in pruning, etc., but the rows should be at least seven feet apart. The Snyder and Taylor's Prolific are the only varieties I would recommend. They are both hardy and very prolific.

Thorough culture and pruning is the only way to grow *choice* fruit and all will be well paid by so doing. Eat abundantly—fresh, ripe fruit will hurt no one, but will add to the health of all.

In this short paper I have simply given an outline of the different *reliable* kinds and varieties of fruits, knowing that there is much more of interest in the discussions that will follow than in the paper itself.

NOTES ON REPRODUCTION IN DOMESTIC ANIMALS.

BY E. A. A. GRANGE.

[Read at Eaton Rapids Institute.]

Reproduction may be defined to be the process by which living bodies produce others similar to themselves—a proceeding which is of great importance to the agriculturist who is engaged in stock raising.

In commencing my remarks upon this subject, it is of little moment where I begin, for if we follow the course through we eventually get back to the starting point.

I have selected for my beginning the period of puberty, or sexual maturity, from which time onwards I shall briefly discuss such subjects as gestation, sterility and its removal when possible, hygienic treatment, or care and management of pregnant animals, hygienic treatment, or care and management of the young, breeding sex at will, concluding with a description of some of the difficulties in parturition; and in doing so, will endeavor to be as brief and practical as possible, for I am well aware that the full consideration of such an immense subject would occupy a great deal more time than we have at our disposal.

PUBERTY, OR SEXUAL MATURITY,

Is the period when animals have sufficiently matured to be capable of bringing forth their young, which condition varies considerably in different species, and even in different animals of the same species. Surrounding circumstances also change the advent of this period; domestication, for instance, by inducing more rapid development of the animal, hastens the coming of puberty, and it is sooner attained in the female than in the male.

Although animals arrive at this interesting stage of their existence considerably before they have matured in other respects, yet it is not considered advisable to breed from them until they are about full grown, as it is thought to weaken their constitutions and produce early decay.

The usual period in the mare being about three years, in cattle say two-and-a-half years, in sheep about one year and a half, and in swine and bitches about one year old; but I have the records of one or two cases where animals are said to have produced their young at very much earlier periods than the above, one of the most remarkable is reported in one of the first volumes of the *Lancet* (a medical journal), in which it is stated that a bull calf three months old copulated with a heifer calf about two months old, and within nine months the heifer brought forth a calf, and both did well.

The period when reproduction ceases is not exactly known. I have known stallions to become sires at upwards of thirty years, and mares are recorded to have produced at considerably beyond that age. Cattle are said to have produced their young at over twenty years; but for other animals, I do not know of their having conceived at any advanced age.

Puberty is preceded by a condition termed the *œstrum* or heat, which term is generally lost sight of in a more popular phrase for each species. This condition is characterized by a peculiar systemic excitement, producing in some animals a degree of ill temper which renders them even dangerous. In the female the generative organs are turgid with blood, with a mucous-like dis-

charge from the vagina which has a peculiar odor that attracts the male and enables him to distinguish between those females which are in season and those which are not. It also seems to excite the amatory desires of the male, which, in a great measure, accounts for male and female animals remaining quietly together when not in season.

The œstrum is intermittent and occurs at certain seasons of the year, but may be induced at almost any time by bringing the sexes in contact with one another a few times. The duration of the heat varies from one to fifteen days; it is shortest in the cow and sheep, and longest in the bitch.

GESTATION OR PREGNANCY

Is the time during which the female carries her young in the womb, while it is undergoing certain development. This period, like puberty, differs in different species, and also in different animals of the same species. The usual time for a mare to carry her young is eleven months, or say 335 days, it often being a little longer when colts are born than when fillies, but the time is subject to considerable variation; for instance, in one case where a record of 284 mares was kept the period varied from 307 to 394 days, but the extreme limits are considered at from 300 to 400 days, below or beyond these being of exceedingly rare occurrence.

In the cow the period is usually estimated at nine months, or say 274 days, but the record of 1062 cows at an agricultural college in Germany gives the average 283 days. In the American Journal of Medical Science the result of observation in sixty-two cows gives the shortest period as 213, and the longest at 336, the average being for male calves 288, females 282.

In sheep the usual time is five months, or say 152 days; in one instance where a record of 429 was kept the period only varied 13 days.

In swine the period is about four months, or, as some record it, three months, three weeks, and three days. The bitch takes only two months or sixty days. As the signs of pregnancy are of importance to those engaged in stock raising, it may be well now to mention some of those which can be recognized without much difficulty. About the earliest symptom taken into consideration is the cessation of the heat, after which the venereal appetite subsides, the animal becomes comparatively tranquil, and does not exhibit any desire for the male, and in many instances the male will refuse to copulate with the pregnant female. This is perhaps more noticeable in the bull than in most other domestic animals. Occasionally we meet with females that will receive the male up to within a very short period of parturition. As a rule in cattle and sheep there is a tendency to lay on fat during the early months of pregnancy, and many owners take advantage of this circumstance when preparing their animals for market.

About the middle period of pregnancy, the means resorted to, by way of telling whether an animal is in young or not, is by making an examination per rectum, or per vagina. I prefer the former, for I think there is less risk of causing abortion. To proceed, the animal should be standing with its forequarters elevated, in order that the fœtus (the creature before it is born), if present, may come closer to the pelvic basin, and to bring it still more within our reach, the bottom of the belly should be raised, by assistants passing a sack, or something of the sort, under it, and raising it up. The rectum should be emptied of its contents, the hand and arm well oiled, and the exploration made. The fœtus can generally be easily felt, indeed when pressed upon it will often make a convulsive movement.

As pregnancy advances, more evident signs develop themselves. The belly becomes quite pendulous and the enlargement of the fetus enables one to feel it through the walls of the abdomen. If the stomach be distended with cold water, the movements of the young creature can often be seen as well as felt. As the period still further advances, and the time for parturition draws nigh, the lips of the vulva become swollen, there is usually a jelly-like discharge from the vagina, and the udders become fully charged with milk.

In the mare, wax gathers upon the ends of the teats. In the cow the points of the hip drop, from the stretching of ligaments, when she is said to be down in her bones, and in the course of a day or two, if everything goes right, the young creature is produced.

STERILITY OR INFECUNDITY

Is the unfruitful result of copulation, and as it is often within our power to remove this condition, it may be well to notice those causes which are of most importance. In some instances it is a permanent condition, for instance it is generally permanent in monstrosities, and hermaphrodites (an animal possessing many of the characteristics of the opposite sex to which it actually belongs) in cattle when twins are born, the one a male, the other resembling a female, the latter is called a free-martin, and will not breed, but it is generally an hermaphrodite. There are cases recorded where free-martins have bred, but then of course they were not hermaphrodites. It is also the result of diseases of the generative organs, such as fatty degeneration of the ovaries, or tumors, which can not be removed.

The temporary causes are often the result of premature, or late coition, when the generative organs are not in a proper condition for conception, or in other words, when the animal is not in season; under-fed or over-fed animals are not so likely to conceive as those in moderate condition. Animals of a very nervous disposition are not so likely to procreate as those in moderate condition. It has also been observed that mares accustomed to work hard, active exertion before being put to the male is favorable to conception, and from this fact, the Arabs often gallop their mares to such an extent as to bring them almost breathless before the stallion, and when the act is accomplished they leave them to stand for a few hours to "cool down."

Change of climate has also an injurious effect upon the fecundity of an animal, sometimes putting it altogether in abeyance, at others only rendering the animal barren for a time.

But in all cases of infecundity, a careful examination of the generative organs should be made, for many cases of apparent infecundity are due to malformation of the mouth of the womb, or some obstacle which can be removed, and almost valueless animals are thus made worth hundreds or even thousands of dollars. If the condition is due to the presence of a tumor, this can generally be removed without much risk to the animal. But the difficulty is very often due to the closing of the mouth of the womb, and this can be overcome by an operation which, if skillfully performed, is not dangerous.

The animal must be secured, if a mare by the side line, if a cow by fastening the two hind feet together, though not too tight. The hand and arm should then be well oiled with, say olive oil, the fingers and thumb, being drawn into as small a compass as possible, should now be introduced into the vagina, and the obstacle felt for; if the fault be at the mouth of the womb, it will be found wholly or partially closed, but it may be dilated by gently insinuating the tips of the fingers until the cavity of the womb is

reached. This operation has been known and practiced by the Arabs for many years on their barren mares, and of late years it has been practiced successfully on cattle. In some instances the mouth of the womb can not be dilated with the fingers; in such instances a surgical operation has to be performed. This should only be done by those understanding the anatomy of the parts.

With regard to the percentage of barren animals I have endeavored to obtain statistical information on the subject, but as records are not usually kept I have not been very successful. In 1881 where a record of 2,764 mares was kept, 73.76 were fruitful, 26.24 were barren, and 3.65 aborted. In the cow it has been estimated that 79 per cent were fruitful. In sheep, out of 8,500 only 740 or about 12 per cent were unfruitful. In an ordinary flock of sheep it is generally estimated that as many lambs will be produced, as there are ewes; the twins making up for the barren animals, etc.

HYGIENIC TREATMENT OR CARE AND MANAGEMENT OF PREGNANT ANIMALS.

The mare, if employed for labor, may be worked up to within a very short period of parturition, if the work be moderate and in harness. She should be kept in moderate condition, and regularly exercised at all events.

The cow, if kept for milk alone, may be milked to within a very short period of calving, but if any value be placed upon the calf, then milking should stop about the fifth or sixth month, for if milking is prolonged it very likely proves prejudicial to the fetus by diverting the elements of nutrition from the womb to the udder; they should be fed on the best quality of easily digested food, care being taken that they do not become too fat, for if obesity is allowed to proceed to an extreme degree it may retard the development of the fetus, or produce abortion. They should be protected from inclemency of the weather, but allowed at all times plenty of fresh air. They should not be allowed to drink too freely of ice or very cold water in the latter months as it is very likely to produce abortion. They should be kept from the smell of blood. In cows it sometimes happens that one will abort after the other, if allowed in contact with one another. The odor of one which has aborted should at once be removed. Harsh treatment on the part of attendants should be sternly suppressed, and surgical operations should not be performed if they can be avoided. After parturition the mothers should be kept comfortable for a few days, as they are very likely to take cold at this time.

ATTENTION TO THE OFFSPRING.

The foetal membranes (after birth) should be removed at once, and the natural openings examined, to see if they exist, if they do not artificial ones may be made and kept open for a day or two with pledgets of lint, or some thing of that sort. All collections should be removed from the nostrils and mouth.

The mother should be allowed, in fact, encouraged to lick the new-born, but should she appear indifferent to her young, she can often be induced to lick it by sprinkling the skin with bran or a little salt. The friction caused by the tongue of the mother is very necessary as it excites the circulation of the blood in the skin, which is very likely to be driven from it when the young creature is deposited in a colder atmosphere than its delicate skin is accustomed to. Young animals should be kept in dry places. After the first birth attendants should leave them as much as possible to themselves, for by too much interference the mother often becomes careless and forsakes the

offspring. As soon as it is able to stand nicely, gentle exercise may be allowed.

Having reached the period when the young creature is brought into the world, it may be well now to discuss very briefly some of the circumstances which control its character, as well as stamp its form. Beginning with the influence of the parent, I may state that the most popular theory is that the male has the greater influence in determining the character of the produce, but I have known of so many instances where the characteristics of the mother were retained, that I am inclined to think, in many cases, neither parent can be regarded as possessing superior powers for developing the character of the progeny; but the popular idea being so much in favor of the male's possessing these superior qualities, has led to his being selected with greater care regarding his pedigree, form, action, disposition, and constitution, while it is too often thought that anything in the shape of a female is good enough to breed from; and, as I believe the better bred and more vigorous animal has the greater power in stamping the offspring, I think this in a great measure accounts for so many young possessing the superior merits of the sire.

Theoretically speaking, it is often supposed that the male gives the external form to the young, while the internal organs resemble those of the mother, indeed the appearance of many hybrids has great weight in establishing this theory. Take the mule for instance, which is the produce of the male ass and the mare; here we have the external form of a slightly modified Jack, we have the long ears, the slender legs, the contracted feet, thin tail of the Jack, while the belly is round and smooth, resembling the mare. Then on the other hand, take the hinny, which is the produce of the stallion and the female ass, here we have the external form of a slightly modified horse, the ears, mane, tail, legs, and feet resembling that animal in a marked degree, while the belly is small and tucked up; but these rules are not always borne out practically, for I have known many animals that would puzzle the greatest expert to tell whether the sire was a horse or jack. In fact it is a common expression among breeders "that such and such an animal breeds after itself, or the sire, as the case may be." So it is plain that the characteristics of both parents are modified to a greater or less extent in the offspring.

While speaking of the influence of the parents upon the young, I may mention some interesting and well authenticated cases where the influence of the male extended even beyond his own immediate get, through the female that he had impregnated to her offspring by another sire, or, as it is sometimes called, "the influence of previous impregnation."

One of the most interesting cases of this nature was a mare belonging to the Earl of Morton, which was impregnated by a Quagga (a species of zebra), to which she produced a striped colt, and this mare produced striped colts for several years afterwards, although bred to stallions without such marks. Indeed there are cases almost without number where mares which have been bred to jacks and produced mules, but their progeny for years afterwards resembled the jack, nor is this confined to the equine race, for there are cases recorded in which polled heifers have been served by short horn bulls, and in after years when served by bulls of their own breed they produced calves resembling the short horns. There are many cases of this description also, but perhaps these are sufficient to show that offspring of an animal is not to be depended upon if she has conceived by one of another breed, indeed some even go so far as to regard the dams in the light of a cross, and there seems to be some reason in it.

Animals are also occasionally born with the most extraordinary marks upon them, through perhaps peculiar nervous influence transmitted from the mother to the foetus. The most remarkable case that I have heard of of this kind is described in Prof. Miles's very interesting work on stock breeding, the substance of which is that a number of Alderney cattle were pastured with some United States cavalry horses with the letters U. S. branded upon them. The heifers eventually had calves, and singularly enough, one of them produced a fawn-colored calf with the letters U. S. plainly marked in white letters upon its shoulder. There are many just as remarkable cases as this reported, which would lead one to think that surrounding objects sometimes have an effect upon the progeny.

BREEDING SEX AT WILL.

This subject has caused considerable speculation for many years, and various theories have from time to time cropped up, gaining favor for a time, or until they were practically proved to be wrong, but as they present a certain amount of interest I shall mention some of those which were most popular. At one time it was thought that the right testicle and the right ovary were instrumental in producing males, while the left produced the females, but this was found not to be the case, as it was shown that animals with only one testicle produced both sexes, and that females with only one ovary brought forth young of the same nature. Another theory which was popular at one time, and is now in some places, was that the sex depended upon the maturity of the ovum at the time of fecundation, and that in the early stage of the heat a female would be produced, but if the act was not performed till the heat was subsiding, a male would be the result. Now, if this were the case would it not happen that animals in a state of nature, who, being allowed to copulate when they feel disposed, would produce a large percentage of females? This does not appear to be the case with sheep. It has also been suggested that the age and vigor of the animal has a good deal to do with the sex, and that if an aged and vigorous male impregnate a young and less vigorous female the result will be a male. It often happens so, but cannot be relied upon with sufficient certainty to be of any practical importance. Some males appear remarkable for getting more of one sex than the other, but the circumstance which controls this remains yet to be discovered.

With regard to the selection of parents I must be very brief, having already occupied a good deal of time. In the selection of the sire I think the weak points of the dam should be considered, and if possible the deficiency supplied by him. I have a great aversion to breeding from unsound animals, whether it be in wind or limb. I am also of the opinion that violent crosses are not advisable. What I mean is that by putting an enormous stallion to a very small, narrow mare you will not get a medium sized, well proportioned horse, but rather a weedy, mongrel looking creature; but the motto which should be adopted above all others is, "Breed from the best."

At this point I illustrated the difficulties of parturition by means of large sized diagrams, without which a written description would be so difficult to comprehend that I omit it.

THE VALUE OF IMPROVED BREEDS OF STOCK.

BY W. E. HALE.

[Read at Eaton Rapids Institute.]

In this busy age competition is the life of all kinds of business. With modern improvements, the facilities for cheap production are the astonishment of the world. At present among no class of producers is the result of lively competition, in narrowing down the margin of profits, more fully felt than among the farmers. The cheapness with which crops and animals may be grown at the west, has and is making it necessary for the man who would thrive at the occupation of farming, not merely to use his muscles, but his brain to study methods and plans by which he may reach the largest and best results at the lowest possible cost; for cost and value have just as much significance in this as in any other branch of business.

In the system of mixed farming as practiced in this State, stock forms the most important factor. We must have cows for milk and butter, swine for meat, sheep for wool and mutton, and horses for labor. Whatever the breed or quality of the animals which the farmer raises, they consume a certain amount of food, also require a certain amount of care and attention, and the return is usually commensurate with the breed and the manner with which they are kept.

One of the primary objects of stock raising, which makes it essential to the farmer is the turning of the coarser products of the farm into money or its equivalent, and at the same time restoring to the soil all the elements of fertility that he can to supply the place of those taken away by constant cropping. How is this improvement to be made? In the past the different classes of stock have been improved only as they followed improved agriculture. When "intensive" farming has been practiced, there has been the greatest improvement in all kinds of stock.

To-day we have several fixed breeds in each of the different classes of stock, and it is by means of the pure breeds that we may hope to make the greatest improvement in the shortest time. If they will not do this, they fail in the purpose for which they were bred. They would be better adapted for show than for adding material wealth to the country. The greatest improvement will be in the greatest adaptation to the uses we have for them.

The farmer who believes that any kind of stock is good enough, incurs no expense or labor to improve it, and pays no attention to the regularity in feeding or the adaptability of the food to the animals, is the one who always contends that stock raising is unprofitable business. But these ideas so prevalent in former years are gradually disappearing. The pure bred male is now wanted upon the remotest ranch as well as upon the cultivated farm, as men of all stations have learned that the native has not the elements that make improvement possible, and that the better the stock the better we can afford to keep them. It probably would not be profitable for all to raise thoroughbred stock. We must then improve what we have by crossing with some of the pure breeds continuously, and never allowing them to go back. After fixing in our mind the breed best adapted to our purpose, we should look for individual merit in the animal we seek to breed from. As the great mass of our common stock has been bred by a chance system, its improve-

ment is not difficult. It being of a varied nature and not bred to any fixed line of breeding, the use of almost any well-proportioned thoroughbred male will make some improvement. With cattle most breeders consider that the first cross is the most marked, but as nature never duplicates its work, if we would secure a continued improvement, we must continue to use thoroughbred sires and never a grade or native, as they are almost certain to breed back and transmit the defects of one or more generations. But some say, "If a one-half or three-quarter bred animal has the shape, size, and quality of a thoroughbred, why will he not transmit his good qualities as well as the pure bred?" It is because there is no fixedness of type, and they do not transmit their qualities with any degree of certainty. The various breeds have been brought to their present perfection only by a long-studied and systematic course of breeding. For examples, Charles Colling, who first brought the short-horn cattle into prominent notice, took the utmost care and pains in selecting the finest cattle from herds that had been carefully bred for years. It is to this herd that is traced all of the purest short-horn blood of to-day.

One of the earliest Hereford breeders, Mr. Price, bred carefully for a time, and by making one cross to increase the size of his cattle, lost all his labor and had to return to his first selection. In making his first selection he secured animals from a herd which had been kept pure for forty years. He then bred them for forty years more, so that for eighty years the character of these cattle was being fixed by careful selection. In a similar manner have our sheep and swine been bred, breeders always having some type or standard from which to breed, and always adhering to that as a model.

That sire is the most valuable that produces the greatest similarity in his getting in the desired direction, and we would be most likely to find such qualities in an animal that shows by his ancestry that care has been taken to breed in a certain direction, and for some definite purpose through several generations. For example, the beef breeds have been bred with the object in view of bringing them to perfection, in size, form, and quality, at the earliest possible age. On an average our native cattle will not weigh over 1,200 pounds at three or four years of age, while by one or two crosses, grades under similar management and care are made to weigh as much, and even more, at two years of age. It needs no argument to show which is the most profitable, a steer or heifer at one year of age that weighs 1,000 pounds, or a two-year-old that with the same care weighs no more. The market reports show that choice grades actually bring from \$2 to \$2 $\frac{1}{4}$ more per hundred weight than good native steers. I might cite you cases where native and grade cattle have been kept alike, and in nearly every instance the difference has been in favor of the grade.

If we can by better feeding and breeding increase at two or three years old the weight to 1,200 or 1,400 pounds, we will not only get greater weight for the same feed, but will save time and get a much better price per pound. The use of a fine woolled ram on a common flock of sheep will not only improve the lambs in form and in quality of wool, but will often increase the amount of wool a pound or more per head, so that you not only add dollars and cents by the increase from the amount of wool each year, but you are adding material value to the sheep themselves.

It is a combination of feeding with breeding that brings good results. A great many act on the principle that the breed is all that is necessary, but no

class of stock can be made profitable without liberal feeding, proper care, and attention. Up to a certain point an engine is useless; all of the heat goes for naught until enough has been applied to produce a sufficient amount of steam to run our machinery. Beyond this, within a certain limit, the more feed we add, the more steam there is produced, hence the greater the motive power. In a similar manner animals act the part of machines in converting the coarse products of the farm into various available forms. It takes a certain amount of food to keep an animal alive, and it is only as we add to this what the animal will assimilate in good wholesome food that we can expect any increase. How many farmers keep their animals at just the point, that even if possessed with a fair amount of flesh when placed in winter quarters—in the spring they weigh less than they did in the fall. What economy can there be in this? Not only is most of the value of the food lost, but all of the care and attention is for naught. If you have stock, that, when properly fed and cared for does not yield a proper return—the sooner you are rid of it the better. The room they occupy and the food they consume could be given to the more worthy ones.

But what could be gained by improvement? One of the great benefits of improved stock lies in their early maturity, and in the large returns for the food consumed. The earlier we can get the same price per pound for our stock, the better. Cattle that give the largest returns for the food consumed, pay the best. The same is true of our sheep and swine. All may not rear cows that reach the highest yields, or sheep that grow the heaviest amount of wool, nor is it necessary. There is not a farmer but values highly the importance of using the best varieties of seeds or grains, and as our stock interests are of fully as much importance, why not take the same care in the selection of our stock that we would if we were selecting our seed corn or seed wheat? If we are to compete with the rapid improvements that are being made in the west, we must exert ourselves to the best improvement by better breeding and better feeding. It means better stock, more beef, more milk and butter, more wool and mutton, more pork, better manure, better crops, better farms, and we are better men. In a word, it means a vast increase of wealth to individuals, and to our State and nation.

Prof. Johnson made a few remarks in which he stated that when we realize that our live stock and our live stock productions exceed all other farm products, and when we remember that twelve dollars' worth of butter, eight dollars' worth of cheese, or between three and four dollars' worth of beef, pork, or mutton, can be sent for the same price as one dollars' worth of wheat, to Boston or New York, then we will see the true value of keeping true varieties of stock.

Good cattle can be fattened at least expense before they are two years old. He recommended raising calves by hand, feeding them oil meal mixed with milk. After the calf is five or six months old gradually substitute bran or oatmeal in place of the oil meal. Feed three times a day for best results.

THOROUGHbred STOCK FOR PROFIT.

BY A. N. WOODRUFF.

(Read at Berrien Institute.)

By thoroughbred stock we mean established breeds,—breeds that have been bred to some certain line for years. Short-horn and Holstein cattle, Percheron or Clydesdale horses, Merino sheep or Berkshire swine are notable examples of our ideas relative to this point.

Most men who engage in stock-raising do so to secure profits. There may be some who raise thoroughbred stock simply to please their fancy; if so they are the exception, for the great majority of breeders of pure bred stock do so with the thought and idea of enhancing their annual profits. How these can be best secured? What initiatory steps shall be taken in this fascinating field of stock raising? What breed or breeds shall be raised? are questions that come to every one who contemplates engaging in raising thoroughbred stock. There are some necessary conditions that must be plainly visible, of which the breeder must be fully conscious, or the profits will doubtless be very meagre.

A love for the business as well as for the profits, and an admiration for choice animals regardless of breeds or owners, are some of these conditions.

To any one who likes to care for stock, who likes to feed them, and who likes to see them eat, the rearing of thoroughbred stock offers one of the most inviting fields of labor that is within reach of the ordinary farmer.

Though a great diversity of opinion exists in reference to the relative merits of the various breeds, still there are some truths so potent in their influence, so self-evident in their nature, and so universal in their application that they can be safely followed by any and all.

In selecting a breed choose one suited to your circumstances, to your conditions, and, other things being equal, to the wants of your locality.

In commencing buy only choice specimens. It is better to pay good prices for good stock than to buy common ones cheaply, or to have inferior stock given to you. Be sure that you have a taste for the business, that you admire good stock, that you are willing and anxious to learn more of the principles of breeding and feeding, that you have an earnest desire to excel in whatever you undertake to do, and a "thirst" for a greater knowledge of stock, and of the management of the same. Being possessed with these qualifications, select some breed that you admire particularly, that seems adapted to your locality, and that is likely to be wanted over a wide extent of country. This will require thought and careful consideration. Having chosen the breed, take a personal interest in it. Be confident "your breed" is a desirable one for certain purposes, basing your confidence on facts, well-grounded and undisputable, and then strive to make it worthy of your expectations.

There is a great deal of stock literature published, and to be successful as a breeder of pure-bred stock, it is well to have some knowledge of the literature pertaining to "your breed." The more the better.

A man may have a choice herd of pure-bred stock, possessed with abundant means, and yet be unable to handle them at a profit.

To illustrate: I once knew a man who purchased a trio of choice Short-horn cattle. The bull proved to be a shy breeder; one of the cows was not only a bad but a "high kicker," and the other cow would jump any ordinary

fence. He soon decided there was no profit in raising thoroughbred stock, and that a fortune could be lost much easier than it could be won following this business. His reasoning was faulty, as he took *his*—an individual instance—as a basis, and reasoned from that to *general* conclusions on the business. Having been unfortunate in buying—his animals being faulty—he judged the business to be deceitful, visionary, and unprofitable.

Having observed this and other similar cases, I conclude that a particular talent is a pre-requisite to success in rearing pure bred stock; but, perhaps, no more so than in the pursuit of many other kinds of business. That the breeder should be *progressive*, never satisfied with present attainments, but ever striving to improve himself and the quality of his stock; that he should subscribe for and thoroughly read one or more of the papers especially devoted to stock interests; that he should have a personal pride in the merits of his stock, but not to such a degree that he can see no beauty or valuable quality in stock owned by others. He should learn to be critical, and be as willing to criticize his own stock as his neighbors' stock; though it is neither necessary nor wise to criticize in a loud or offensive way. What I wish to convey is simply this: he should be able to note the defects in his own stock, and to see and admire the good qualities in his neighbors' animals.

Stock breeders are generally hospitable and courteous; they should strive to be generous and charitable. Be willing to recognize merit and superior quality in all the different breeds of stock, as no one breed is best in all respects or under all circumstances.

In starting a herd of pure bred stock use care and thought in selecting; buy only of reputable breeders,—breeders of known character and integrity. No man can afford to misrepresent in business dealings, and for the breeder of thoroughbred stock to do so is to strike a death blow to his business. Still, it has been practiced in the past and doubtless will be in the future.

While a judicious buyer or breeder will not be governed solely by pedigree, yet he will give due consideration to it, and when a good pedigree and a good animal are combined satisfactory results may confidently be expected. While all who engage in raising thoroughbred stock may not be successful, still I am confident that to any one who has a taste for the business, and who will give it the same personal attention, combined with energy and prudence, as is given by any successful business man to his business, the breeding of thoroughbred stock will prove a safe, satisfactory and profitable investment.

THE IDEAL FARM HORSE.

BY PROF. E. J. MAC EWAN.

[Delivered at Eaton Rapids and Caro Institutes.]

As an ally in agriculture, and as a beast of burden the horse has played a minor part, until within the present century; but he has always occupied a position of literary and scholastic respectability. Sacred and profane literature is full of the horse. Moses chronicles the horse trades of the incorruptable Joseph with the hungry Egyptians; Homer compares Ajax bounding over the ships to the horseman "who well knew how to ride several horses at once, over the public highway," and tells how many admiring watched him,

"Men and matrons as well. Not losing his balance the rider
Springing would change from one to another while they were flying."

Then "Trainer of horses" was a name of honor conferred by the gods. Virgil, the greatest of Roman poets, who lectures on agriculture, describes for farmers' use, a horse corresponding very well to our smaller and finer Percheron:

"Fine in the head and lofty in the crest,
Brawny in back and broad and deep in chest,
Short, stout in body, with thick flowing main,
A double spine, and solid hoofs that spurn,
And powerful beat the earth at every turn."

[Does he purposely omit the legs?]

Adonis's black horse, as described by Shakespeare comes nearer the old fashioned Morgan:

"In shape and color, courage, pace, and bone."
"Round hoofed, short jointed, fetlocks shag and long,
Broad breast, full eye, small head, and nostril wide,
High crest, short ears, straight legs, and passing strong,
Thick mane, thick tail, broad buttock, tender hide."

Every schoolboy is familiar with Browning's sympathy for the thoroughbred, as seen in "How they brought the news from Ghent to Aix." Not only literature, but art abounds in horses. The war horse of Job, the Oriental horse of Mohammed, the chariot horses of the Romans, the barbs of the Moor, the saddle horses of the Turks and Arabians, the great heroic horses that have dragged the artillery and ambulances of the vast armies, the sculptured Greek horses of Phidias, and the painted Norman horses of Rosa Bonheur are matters of which all persons of general information and culture must know something. One so remote from practical agriculture as a professor of English literature, then, may honestly talk about horses and not be stigmatized as a jocky or a Jehu, or even an equine parson. This paper, however, is not intended as a discussion of the horse from a literary or artistic point of view, but from the practical business standpoint of the general farmer, whose operations must be carried on by horse power, and whose surplus horses go to the market like any other surplus stock: not from the standpoint of the special breeder, but the small farmer, who wants the best team for his own use and horses that will readily sell at remunerative prices.

While the lines of work for horses are becoming more definite year by year, and horses are being bred and broken for more definite service, yet the breeds are not so numerous, distinct, nor well defined as those of the other domestic animals. Our large draft horses come to us mostly from France, Scotland, and England, where much interest has for many generations been taken in their breeding. A breed is a classification by which we distinguish a group of animals possessing qualities not common to all the species, which peculiarities are so firmly established that they are uniformly transmitted by heredity. Practically, the distinctions of breeds are confined to marked differences of appearance, function, use, disposition, or quality. Horses might be classed by the uses to which they are adapted—drafters, coaches, roadsters, saddlers, general use; or by their gaits—runners, trotters, pacers, single-footers; or by a combination of the two, which is the more common if the less philosophical way.

The French horses, called formerly Normans from their home, Normandy, and now generally Percherons, from La Perche, are mostly dapple-gray, with

sometimes a black or other color. They are from $15\frac{1}{2}$ to 17 hands high, and weigh from 1,400 to 1,800 pounds. They have a strong frame, rather sloping shoulders, not very long body, somewhat drooping rump, short tail, big, round, clean leg, and pretty good feet. Snug, compact, easily kept, strength and endurance are their characteristics. They often possess good action for such large animals, and are generally of good disposition. Their breeders claim for them a fast walk and good trot, but this must be in comparison with the Durham steer.

The Clydesdale takes its name from the river Clyde in Scotland, and is one of the most popular British breeds. These horses have large heads, somewhat sloping shoulders, long back and body, with hindquarters long and well developed. Their size and weight is somewhat above that of the French horse. Bay and brown, with white on the face and some or all of the feet, are the favorite colors. The lower part of the leg is covered with long fine hair, which is much prized as a mark of high breeding. It is claimed that they have unsurpassed flatness and strength of bone in the limbs, and have an unusually good step on the walk. Long ago the development of mines in the south of Scotland made a great demand for heavy drafters about Glasgow. These horses were already considered excellent, but the English draft horse, having superior size and symmetry, was used to perfect the Clyde. The head and body of the shire horse, with the shoulder, muscles, leg, and action of the Clyde, were supposed to make perfection in the combination. This crossing is still going on in both Scotland and England.

The English shire horse varies considerably, but in general resembles the Clydesdale. A little lighter and handsomer, with equally prized long hair on the legs, as we see them here, it often puzzles even an expert to distinguish them in the show ring from the Clydes. When well bred at home they are said to be very smooth, round turned horses, weighing 1,600 to 2,000 pounds; close coupled, very strong backs, round barreled, deep chested, strong flat legs, 16 hands high, good style and action, and particularly fast walkers for big horses. With a mild disposition they combine great courage and endurance.

The only distinct breed of coachers is the Cleveland Bay, and this breed is almost extinct. This is a large, elegant horse, standing from 16 to $16\frac{3}{4}$ hands high, and weighing 1,250 to 1,450 pounds, with a fine head, full bright eye, long arched neck, oblique shoulders, deep chest, short, strong back, and powerful loin, long quarters, strong cordy legs, and perfect feet. The color is always a beautiful mahogany bay, mane and tail black, full and flowing, and legs black and free from white markings. Youatt, comparing them with the Norfolk farm horse, a kind of English draft which, crossed with the Hunter, produced them, says: "Now we have an animal, tall, deep-chested, rising in the withers, slanting on the shoulders, flat in the legs, with far more strength and treble the speed." Strong in bone and sinew, this animal has size enough for general work, style and speed enough for a gentleman's carriage, and a muscular development and ease of movement denoting great endurance.

The thoroughbred or running horse, on which great care has been bestowed for many years, both in Great Britain and this country, traces its origin to the Arabian, Barb, Turk, and other desert horses. It is one of the most clearly established breeds. It is largely, however, the product of British skill in selection, breeding, and training. Running horses are of all colors, but bay, black, and chestnut are the favorites. They are often tall, $15\frac{1}{2}$ to 16 hands, but never heavy, 1,100 pounds being about the average. They are slender,

rather long-legged, with small head and pointed nozzle, light wiry neck, narrow chest, well-sprung ribs, a fine strong back and loin, and long hind quarters. The mane and tail of the thoroughbred are usually light, their hair fine, and skin thin. Always high spirited—too spirited for quiet work—their great energy, endurance, and fineness of texture, have made them invaluable for improving coarse dull breeds. Of course their gait unfits them for harness work. The name *thoroughbred* belongs to this class by common usage, and should not be applied to any other breed.

The trotter is entirely an American institution, usually an American plaything; (the whole institution is the American millionaire behind a 2:20 span at a 2:20 gait) and, although of no established form, color, size, or weight, is entitled to be called a distinct breed. Trotting horses vary from 14 to 17 hands in height, from 700 to 1,400 pounds in weight, from the slight form of the runner to the chunky form of the draft horse, and from a dirty gray, dingy, dim, flea-bitten roan or calico, to the most fashionable bay, brown, black, and chestnut. On the track they seem thin, slim, and long-legged. Like Cassius, "they have a lean and hungry look," but many of them are powerfully muscled, and have sufficient size and force for any ordinary work. The mental organization, instincts, and physical conformation of the trotter, as developed at present, form so extended a topic that they cannot with propriety be explained in this paper. This breed is descended from thoroughbred stock on both sides, with frequent crosses of pacing blood, but the running ancestry may be very remote. The families are very numerous—Messenger, Mambrino, Abdallah, Hambletonian, Bashaw, Clay, and Morgan, with their branches, being the most noted. These are families, let it be understood, and not distinct breeds. If a horse can trot or pace in 2:30 or better he is a trotter or pacer; if not, or if at this gait he is not used in public races, he is called a roadster.

There are several distinct families of pacers, but their origin is not easily traced. Many trotting horses pace very fast; and many pacers trot very fast; so, some of the highest authorities begin to think they should be considered the same breed. The common outward characteristics of the pacer are rather small size, long head, and short, straight neck, tendency to roach back, long sloping rump, long slanting hips, well bent hind legs, and long heels, slanting under the hoof. Common families are: Narragansetts, Hintogas, Blue Bulls, and Pilots.

The roadster is not a distinct breed, unless we make the name synonymous with trotter. The name is given generally to those animals which are used in the light wagon, for business purposes or pleasure, and consists mostly of trotting bred horses, too slow to be valuable, and various animals in which trotting crosses predominate. This is the nearest approach we have to a "general purpose horse." He is called on to do the farmer's work, pull the butcher's, baker's and grocer's wagon, take the doctor twelve or fifteen miles an hour, on the country road, drag a hack or omnibus all day on the stony pavement, gallop under the saddle, and plod in the tread-mill.

From this classification and description, it is seen that there is not only no well established breed of farm horses, but no horse that meets the farmer's wants for every kind of work, unless it is the almost extinct Cleveland Bay. Wordsworth, when asked which was the best of his poems, answered; "Sir, they are all the best." And so we should have to say of the breeds of horses if we consulted different breeders. "They are all the best," from the 800

pound trotter or runner to the 2,200 pound cart horse. But a careful examination of the farmers' needs shows that none of these are the best.

There is a big place for big horses, but it isn't on the average Michigan farm. Life is too short for us to await the notions of the great flabby, sluggish, spongy-boned lubber, the plodding mastodon of Europe, performing his allotted round of drudgery on a soft soil, without hope or fitness for anything else. Smaller teams will perform our ordinary work more quickly, easily, and with less feed than these loose-made, spiritless carcasses, on limbs big enough to support a meeting-house, but too often soft as Michigan bass-wood. They are too slow for American tastes and habits as well as for the intelligent American notion of bringing things to pass.

The thoroughbred and high bred trotters generally lack the essential qualities for farm work, size, and mental organization. Like the boys who go away for a term or two to the town school and then come home, they are too much gentlemen to work. Nervous and high strung, they waste their energy in fighting against the bit, the driver, and menial service. Their finer texture will not compensate fully for their lesser bulk. A dead pull of a ton or more requires weight as well as muscle and nerve to move it. Farmers, like their brethren in other occupations, may occasionally like a fast horse. We see them every day on the road with what has been bred for a stepper—and is a thing that over-reaches, or straddles behind and paddles before, or scuffs and kicks up a dust, or stumbles, or holds his tail at one side or between his haunches, or goes sideways, or is a fool and can't take care of himself, or has a barrel head, drooping rump, rat tail, and the temper of a red headed old maid, or the willfulness of a married woman with a model mind and an awful appetite to wear the trousers. The ordinary farmer has no business with fast horses. These should be left to the professional breeder, and the Bonners, Vanderbilts, Cases, Kittsons, and Rockafellows, who have time and money to spend for mere pleasure, without hope or desire for other reward.

The farm horse must be evolved from some of the existing breeds. The general farmer must know definitely what horse will best do all his farm work, and then, in the light of modern scientific breeding, he can produce him. What then is the ideal farm horse? The small, compact, clean-cut, wide-awake, Percheron, small sized English draft, or Clydesdale, the largest and strongest thoroughbreds, hunters and trotters, if quiet, and the good, old fashioned Morgan of great size will do farm work, and always sell; but none of these is the ideal farm horse. He must combine the warm, courageous, enduring blood of the thoroughbred or trotter, the coolness and patience of the Percheron, the solid resoluteness, docility, and intelligence of the Clydesdale, and the size, style, action, and color of the Cleveland Bay. He must have both the power and the will to do what is demanded of him. His power will come from his physical conformation. He must be good for a long day's or month's journey, or for a heavy load on a steep hill. He must be able, in span, to do the plowing, haul the cord-wood, and go to mill, to church, or to town at the rate of ten or twelve miles an hour. With plenty of bone and muscle, he must be symmetrical all over, elegant and stylish, with action high and trappy, a stalwart, slinging walk of five miles an hour, and a good swinging, vigorous, determined trot equal to a four minute gait. He must be sixteen hands or more in height, and weigh from 1,200 to 1,400 pounds, a snug, compact, heavy body, on legs not too long. A medium sized, bony head, expressive, without coarseness or clubbishness, full between the eyes, with straight profile, and full, bright, hazel eyes and slim pointed ears, should

be set on a neck of good length and finely arched crest. The shoulder should be thick at the point, strong at the top, oblique and long, with high withers. The chest should be deep, low down between the arms. The barrel deep, round, and not tucked up in the flank, should carry out level on the rump, with the tail set on high, and slightly arching. The back should be straight, firm, and strong, joined to the rump by an even mass of muscle, with powerful loin, and long, broad quarters and thigh, well muscled down toward the hock. The leg should be broad and flat with long, strong joints, bone as dense as ivory, sinews like steel, short, slanting, elastic pastern, and round, open-heeled hoof, dark colored, fine grained and smooth. The horse's wind must be strong and his digestion perfect. He should be bay, brown, chestnut, black, dark-gray or roan; bay is the best of all colors, not fading in the sun; and he should be free from objectionable white markings. He may be taller and heavier than this ideal, but not smaller nor lighter. While strength is not always governed by size, there are times in almost all farm work when the dead weight thrown into the collar is of quite as much value as nervous force. His carriage must be lofty and gay, his form smooth and shapely all around, and his appearance attractive at rest or in motion. He should be handsome, and be proud of it. He should impress you, not as specially adapted to one thing, the race course, the plow, the heavy load, but as suited to the various uses to which the farmer may put him—to pull the plow, to feel at home on the reaper or threshing machine, trot off smartly with the family carriage or the little road wagon, walk briskly with the load of hay to the barn, or of grain to market, or carry a man proudly on his back.

The *will* to do depends on what we may call the horse's moral qualities or instincts. He must possess intelligence, courage, be easily controllable, never skittish, nervous, or flighty. A cowardly horse, like a cowardly man, that smells the battle afar off and stops there, is good for nothing. With gentle disposition, fine temperment, and sagacity, there must be docility, patience, spirit, and resoluteness.

The most valuable gait for the farm horse, as, indeed, for any horse used for economic purposes, is the walk; and it is the most neglected. The lazy, dull, sluggish, slow walker has no place on the farm. A careful estimate of the time spent by the farm team on the walk, at the plow, harrow, seeder, planter, cultivator, reaper, mower, or the farm wagon, will prove the value of a fast walker. Only in the family carriage, single buggy, empty wagon, or under the saddle, does the farm horse go off the walk, and here he can rest without so much loss if he walks rapidly. A fast walker will go five miles an hour, a slow walker three—a difference of 40%. Compute the loss of time and money, especially in hurrying times like haying or harvest, when the work of several men depends on the movement of a single team, or when you are cultivating short rows of corn or raking hay, where the horse must turn about every few minutes, and you will lose all patience with the horse that considers a gait of more than two miles an hour, or more than four turnings about between breakfast and dinner, unorthodox. Almost everything is going now at steam engine rates, and the horse must approach this rate of speed to be serviceable or bring the cash.

While the horse thus described is the ideal farm horse, he is also in great demand in the cities, at big prices, to draw the gentleman's family carriage, and is known as the "*coacher*" or "*park horse*."

The requirements of the park horse are thus described by Dr. McMonagle: "A park horse should have a great deal of blood, be of good action, and be

able to trot a mile in $3\frac{1}{2}$ or 4 minutes, or go eight, ten, or twelve miles an hour if necessary. He should be a stylish bay, standing 16 hands or over, and weighing 1,200 pounds. He should stand erect on his forelegs, hold his head and tail high, and be perfect in symmetry and form. He must be large and broad in his hind quarters. He should be proud of himself, and dignified and elegant in his bearing, easy and graceful in motion, full of nerve and ambition, but of pleasant disposition, firm of flesh, sound in bone, not liable to spavin, straight in limb and standing squarely on his feet."

SCALE OF POINTS FOR JUDGING HORSES APPLIED TO THE PARK HORSE.

1. Size, 16 hands being the standard ; weight, 1,200 pounds.....	8
2. Proportions, general symmetry and perfection of form.....	10
3. Elegance and loftiness of style and carriage.....	10
4. Color dark, free from bad markings on the face or feet.....	5
5. Head clean, broad, expressive, and not too large.....	5
6. Eye and ear bright, cheerful, and expressive of docility.....	5
7. Neck, length, shape, and quality, with character of shoulders.....	5
8. Back and loins	6
9. Hip and whirlbone, and setting on of tail.....	5
10. Quality of limbs and feet.....	10
11. Action lofty, free and bold, knee well bent at speed.....	6
12. Speed equal to a mile in 4 minutes to road wagon.....	5
13. Docility and kindness of temper.....	5
14. Pedigree, showing an inheritance of the quality desired, and the consequent ability to transmit it.....	15
	<hr/> 100

Such horses are as marketable as fat steers, and in well matched spans at four or five years old will bring from \$600 to \$2,500, or even more.

This stately coach horse, identical with what is best adapted to farm purposes, must be evolved from the various strains of best blood and brought to a perfect type. Large in form, elegant in carriage, finished in outline, bold and commanding in action, he is eagerly sought for by the wealthy classes at fabulous prices; and closely matched teams will bring any sum within the range of conscience. Of the varieties of horses that have been imported into this country, first and last, what is still called the Cleveland Bay comes the nearest filling this description; and he has the size, the color, the bone, and the general form of the ideal farmer's horse. He has sufficient size, for the ordinary span to plow even stiff clay soil, and work the improved implements now used, and speed enough to do the road work, either in marketing or in the carriage. The uniformity of size, color, and action makes them easily matched and salable. But the Cleveland Bay is practically unattainable, and there is no breed on the face of the earth to take its place. It isn't in Europe, it isn't in America. Individual horses that answer the description, and they are numerous, are essentially accidental productions. Horses have been bred for every quality under the sun except for elegance of form, combined with style and size, and as these are the prime qualities of the farm horse, the farmer must make a breed by judiciously selecting and breeding for a specific type. The ordinary horse can be built up, gradually, through successive generations, by judicious development, to the size, style, power, speed, and temper required. We have the raw material here at home in tolerable

abundance to develop in time just as good a horse as the Cleveland Bay, except the uniformity in color, which we may approach; and we will have superiority in speed. As the horse must get his start in all good qualities,—disposition, constitution, form, and style,—by inheritance, it will be necessary to breed the best to the best to begin with. Then, by a careful, systematic, and persistent course of inbreeding and crossing of such breeds, families, and individuals, as will be most likely to transmit the uniformity of conformation and character desired, we shall in a few generations establish our breed. Sires must be selected on their individual merits. Wherever you find the ideal horse, take him; if he is a fast trotter all the better: if of a family noted for size and beauty, still the better. Find dams of the same type in the same way. Don't throw all the responsibility on one parent. To produce in a reasonable time an invaluable race of horses for the farm, coach, or road, if the ideal horse and mare cannot be had or are too expensive, the best common mares, with a preponderance of trotting or thoroughbred blood, might be coupled with the most intelligent, active, healthy, well formed, compact, wiry, strong, and enduring draft stallion of small size, Norman or English. The female product crossed in due time with the most intelligent, active, healthy, best formed, best natured, and largest trotting horse, Hambletonian, Bashan, or Clay; the female progeny again bred to a trotter of the same character, or the most intelligent, active, healthy, best formed and largest thoroughbred, and in most cases the fourth generation would be the ideal horse, the animal of most practical value and worth.

This is the way the fine large California roadsters were bred. A few breeders imported some small, compact, fine style Clydesdales—coupling them with finer strains, increasing the size of brood mares, and retaining much of the quality of the better blood. These were coupled with Elmo, a large thoroughbred, a lineal descendant of the imported Barb Grand Bashaw, and the female product crossed with the grand large trotter Belmont. This breeding has left its impress on every class of horses on the Pacific coast. On the race-course, on the trotting tracks, on the road, before the carriage, on the farms hauling the heavy trucks of the cities, stages, street railways, everywhere are to be found these descendants, and in every situation playing well their part, and gaining honor in every field.

Or, you may select the best, large, well made mares, of the best constitution, shape, action, temper, and style, wherever you can pick them up one-fourth grade drafters, or better large trotting mares, and cross these with a large thoroughbred or trotter of good bone and muscle, and perfect symmetry; 2d, 3d, or 4th rate of speed is as handsome, stylish, as first-class, and perhaps better for getting offspring for the purpose of the farmer or citizen. By careful selection, and adaptation, in four or five generations, or even less, we should have a horse as good in all respects as the Cleveland Bay, and better in action and speed instinct.

This is the way the Cleveland Bay was made. Fifty years ago these horses were large and coarse in all their points, and sluggish goers,—more like the amiable old cow than the spirited smart steppers they now are. But they were strong, healthy, and long lived. The females were a good foundation for a better progeny. They were coupled with stout thoroughbreds, and hunters of a bright bay color; and the female offspring again coupled to thoroughbreds and hunters, and the third generation were largely made up of the lofty, powerful, stylish, rapid, enduring Cleveland Bay of the present day.

Until farmers realize the necessity of more careful study of the science and

principles of breeding, and understand that it is as necessary first to lay a foundation, for a breed of horses as for any other structure, and that to secure this foundation, they must fix upon a certain line of breeding and *follow it persistently*, retaining the best mares, we need expect no decided improvement and no uniformity in breed.

By the popular clamor for Hambletonians or Lexingtons the otherwise intelligent farmer is too often beguiled by the oily tongue of a cross-roads horse keeper to breed to a bogus pedigree and an unsound horse. He forgets that Lexington was a homely, clubheaded horse, having only speed to commend him, and his ability to transmit speed was balanced by his liability to transmit blindness. Hambletonian, head of the greatest family of trotters, was a "coarse critter" with a head like a barrel, impressing one indeed with majesty and power, but siring animals of all sizes without any uniformity. You may be pretty certain of getting big-headed, leggy, weedy, loosely-coupled, loose-jointed, light-boned, slab-sided, ewe-necked, cat-hammed, calf-kneed scrubs of colts, so long as you breed the banged up old mare, with all the constitutional diseases, to the wheezing, stiff-necked, stiff-kneed, spindle-shanked, gimlet-rumped plug,—called the son or grandson or great grandson of Hambletonian or Lexington or Messenger, brought to the neighborhood by some guileless benevolent missionary who does business on a ten cent, three-for-a-quarter scale, and has no scruples against helping to perpetuate a race of churn-headed, light-waisted, fiddle-flanked, steeple-hoofed, switch-tailed caricatures of the horse.

The history of the American trotter proves that when there is a demand for a horse with well defined qualities, the evolution of the animal is certain. In this case speed at the trot was the one thing desired; and the breeder used the horse that could win the race, and get winners, whether he were big or little, white or black, sound or unsound, vicious or docile, homely or handsome, coarse or fine, thoroughbred, cross-bred, or hybrid.

The thoroughbred has been established to meet a demand. The trotter has been established to meet a demand. We are in a position to establish a breed of farm horses more quickly, more easily, more certainly, and of better quality, just as soon as we are proud enough not to accept for our stud what is too slow for the track or road, too light for the truck, and too homely for the coach. The valuable blood of the thoroughbred racer appears prominently on our trotter; it has enriched the pacer, the coach horse, the draft horse, and the general horse. Speed, form, endurance, beauty, nervous organization, ambition, courage, are the qualities he has engrafted on mongrel stock wherever the horse is a domesticated animal. If the racer brought with him gambling, cursing, swearing, drinking, the eating of oysters, and a distaste for moccasins and the middle-aged virtues, he still makes the nag we drive every day pull truer, last longer and evince more courage; he gives finish and dash to the saddle-horse and he lends grace and pluck to the light harness horse; superb in outline, perfect in form, finished in contour, endowed with brain, fleet of limb,—he is still the most nearly ideal horse. Whether speed instinct is imparted to the trotter, by the imported thoroughbred, or has been engrafted on our horses by American trainers, and American breeders, who began the development of the American trotting action, when neither the thoroughbred nor the native had any trotting instinct or inheritance, does not matter. By training and breeding through successive generations there has been evolved a breed of trotters full of trotting instinct and inheritance, and possessing strength of bone and muscle, endurance, activity, symmetry of

form, vigor of constitution, perfection of action, and a prepotency inherited from the finest lineage and transfused through the best blood of its kind. Wendell Holmes says: "Wherever the trotting horse goes he carries in his train brisk omnibuses, the lively baker's cart, and, therefore, hot rolls, the jolly butcher's wagon, the cheerful gig, the wholesome afternoon drive with wife and child—all the forms of moral excellence except truth, which does not agree with any kind of horseflesh."

This is no place for special pleading for the turf, but the trotting horse of America, with all his singular excellence and great utility, could have no existence but for the turf. Speed, and the severe test put upon the muscles and constitution in bringing it out, can come of nothing but the best of parentage, endurance being the desideratum. Public running in the public races has made the thoroughbred and maintained his speed and bottom. Public trotting in public races has developed the trotter of the highest type, and established his speed and bottom. The invaluable qualities of these classes could be developed and sustained in no other way. But here is the practical point for us; for every running or trotting horse that is used for sporting purposes in fast public races, there are hundreds employed in other labors, roadsters used in recreation or business, and many of the horses on our farms whose value, in endurance, activity, and stoutness, is due to the turf. Every class of horses—except mammoth drafters—has been made quicker, stronger, more active, more enduring, more capable of doing sharp work and retaining a good healthy condition, through the efforts of the race course. And it is to the families that have made great names here that the farmer must look for the foundation of his ideal horse. The excuse for the existence of the institution known as the turf is the production of a proper foundation for the farm and coach horse, as well as the roadster.

Many of our farmers are breeding for a special purpose, but none specially for himself. One breeds draft horses, and there is profit in this class. Strong, heavy, slow horses are wanted for drays, trucks, and express wagons in the cities, and for teaming use in the lumber woods; and they will bring cash as surely as fat hogs. The farmer who thoroughly prepares himself to raise big horses with good action, good legs and feet, and strong, robust constitution, and weighing 1,600 lbs. or more, has a gold mine in his stable, the more profitable the more industriously it is worked.

Another breeds trotters and roadsters, and there is profit in this. The trotter is the fashionable horse always in demand at top prices, and the roadster is an indispensable agent in all active business pursuits. The roadster that can strike the key note to a two-twenty gait, or road fifteen or eighteen miles an hour, will bring a fortune, and a few such will make the breeder as rich as old Mr. Cræsus. But to produce the iron will and stout propelling power, the hard, muscular form, stout bone and sinew, and the accumulated nervous energy to accomplish this feat, the farmer needs all the skill of half a dozen expert scientists to trace out the lines of stock that will assimilate and reproduce their kind, and he needs more capital to begin with than the profits of the last corn crop.

Now it is time for us to begin to breed for ourselves. You all know that an elegant bay horse, 16 hands, 1,250 pounds, symmetrical, lofty, stylish in his carriage, proud, a good stepper—four minutes or better,—with the trappiness, docility, and style of the best old fashioned Morgans, drawn out in length of body, limb, and neck till perfect proportion is reached, will bring a good round price whether the country is prosperous or panic-stricken. The Morgans,

and Messengers, and Clays, and Hambletonians, and Bashaws, and Merrills, and Patchens have been the serviceable farm and family horses; but they have lacked size; to get this in uniformity and retain their other excellencies is the farmer's problem, and needs careful breeding and considerable time. Breed carefully for this purpose, and don't forget to breed for brains. The horse that is a coward or fool is good for only a Paris restaurant. You will occasionally blunder into rearing a genuine trotter, but it won't hurt your reputation a bit nor lessen the animal's value. You can prepare this kind of horses for market yourself. No need of humbug trainers, humbug speed accelerators, and stables lined with sweating clothes, boots, straps, and toe weights.

Revolutions do not go backward. The farmer has caught the spirit of this age of progress and improvement, and he too is going forward. The vineyard, the orchard, the garden, the drained fields, the stall, the sheep fold, the dairy, the sugar, all attest his enterprise. A little while ago the Concord grape, Jonathan apple, Merino sheep, Durham, Holstein, and Hereford cattle, and the amber cane were things unknown to him, yet he was contented. Now, stimulated by these acquisitions, he is seeking other conquests. The western industrial press, and the western industrial colleges are giving him sound practical instruction and sending him sound practical leaders, and practical workers. He cannot much longer fail to see that in a main source of his pleasure and recreation, and the profit of his toils, he is inflicting on himself losses and annoyances by sheer neglect. Every mile he travels, every load he draws, every rod of soil he cultivates testifies to the need of better farm horses; nineteen-twentieths of the horses in the land are used for work, and nineteen-twentieths of the ardor and effort for improvement are expended on the sporting horse. In these is constant improvement and development, while the ordinary farm horse is little better than he was forty years ago, and this little is fortuitous. When the farmer gives as much thought and effort to raising a farm horse that is to be the constant companion of his toil and the chief producer of his income, as the sporting-man does to raise the colt that for a few minutes a day, occasionally shall contribute to his pleasure or his gains, there will be the same improvement. Within a dozen years he will do this; and within two or three dozen years more the American farm horse will be the best horse on the globe.

HIGH BREEDING OF HORSES.

BY JOHN M. MATHEWSON.

[Read at Grand Rapids Institute.]

The importance of high breeding is a subject intimately blended with the spirit of this fleet and progressive age. It is now receiving more attention than formerly. The thoughtful and learned are turning their attention to it. And perhaps there is no subject of like importance to the individual and nation that has been so generally neglected and so little understood.

All understand and agree that if it will pay to raise an animal, it will be the more remunerative to raise the best. Yet how many continue to breed and raise those that are comparatively worthless, when with care and thought

they could in a short time have two pounds of beef where they now have one; could as well raise a horse of the value of two hundred dollars as one of the value of one hundred dollars. This could be done with the addition of but a small expense, and will apply to all our domestic animals. This would not only enrich the individual, but the nation. The value of our domestic animals in the United States is about two billions of dollars. This amount could be more than doubled in five years, without adding to the number, with proper care and attention to breeding. We would not be understood in this lecture that by high breeding we desire to recommend the breeding of any particular kind of stock, nor any particular family or strain, but the elevation of each by careful, thoughtful, and judicious selections and breeding. One engaging in the business of breeding stock should be governed by the kind or kinds he desires to rear and the depth of his purse, the soil and the climate where they are to be raised and locality as to market, and other circumstances under which he may be placed.

One raising swine in Maine would not be likely to make it profitable with the same type as one in a great corn-producing state and distant from market like Kansas. One raising cattle in the East, near the great cities of the country, where milk, cheese and butter are in great demand, would not be likely to want same strain as one distant from market and in a great grazing country like Texas. One having a few brood mares with a mixed farming business and limited means, would not be likely to make a success in raising colts from the same strains as those reared upon our great stud farms. When one desires to raise any kind of stock and has come to the conclusion as to the particular kind he desires to rear, he should then strive to produce the most perfect ones of their kind, as they will always prove to be the most profitable.

How to do this is the important question under consideration. This is a problem that can hardly be solved; it cannot be demonstrated. Although there are some general principles that may be suggested that will be beneficial to some, and they are so plain and self-evident that they need but to be stated to be understood and approved by the thoughtful.

Mr. Stonehenge, in his very valuable book, entitled, "The Horse in the Stable and the Field," gives his readers sixteen rules under the head of Principles of Breeding. They are entitled to great weight and credit on account of the high authority from whence they emanated. Mr. Herbert, in his valuable work, entitled, "The Horse of America," copies these rules verbatim, and approves of and comments upon them at great length.

Mr. Youatt, in his very valuable work entitled "Youatt on the Structure and Diseases of the Horse," uses some of them without comment, is silent as to others. In regard to them we are willing to confess that some are beyond our comprehension, that some of them are so intricate that we do not understand them and we think are not susceptible of demonstration or proof, therefore we do not adopt or reject them. Some of the others are slightly in conflict with each other. To illustrate: Under his Rule 11, which is "The influence of the male upon the Embryo," he uses this language: "Nor is anything known of the laws which regulate the temperament bodily, or mental power, color, or conformation of the resulting offspring." In Rule 12 he lays down this principle. "That like produces like or the like of some ancestor." In Rule 13 he says "The purer or less mixed the breed the more likely it is to be transmitted to the offspring." In discussing these questions we approach them with a great deal of caution and delicacy, on account of their very high and learned authority and on account of our very limited

knowledge and experience upon this subject. Still we feel like expressing our individual thoughts and opinions upon the subject rather than those of others however high they may be. Therefore we say we agree with his proposition laid down in Rule 13, that "The purer or less mixed the breed the more likely it is to be transmitted to the offspring," and we agree with his Rule 12, "That like produces like or the like of some ancestor," with this qualification or addition, that like produces like, or the mixed qualities of its ancestors. It is an admitted fact that no two blades of grass are alike; no two living beings were ever known to be exactly alike.

That great father of trotters, Imported Messenger, never sired a colt like himself in the strict sense of the term, neither did Rysdyk's Hambletonian, so with the Godolphin Barb or Arabian, so with English Boston, Lexington, and the great Leamington. Although in all of these their reproductive powers were great, perhaps unsurpassed, still their progeny partook more or less of the admixture of former ancestors. There never was but one Leamington, Lexington, Boston, Eclipse, Godolphin, Arabian, Rysdyk's Hambletonian, or Messenger, although, as has been said, each of these possessed in a marked degree the power of transmitting his qualities to his offspring. Assuming these two propositions to be correct, either as stated by the learned author or the speaker, how are we to reconcile them with his rule 11, where he says: "Nor is anything known of the laws which regulate temperament, bodily or mental power, color, or conformation of the resulting offspring." If this proposition be true what becomes of the other two rules, 12 and 13, where purity of blood is recommended because of its influence on the progeny, and where like is said to produce like, in order that we might have some sort of guide. If the 11th proposition of the learned author be strictly true, then it appears to us that the other two must be untrue and worthless, and the breeder is all afloat upon a sea of uncertainty and chance without chart or compass, and in breeding is as likely, after all his care and pains, to get a bodily and mentally weak mouse-colored pony, and of a poor and unsound conformation as the produce of a large, sound, bay thoroughbred mare of perfect conformation coupled with a thoroughbred stallion of the same family as the mare, both of which have been bred through a long line of large ancestry of pure and unmixed blood of one color and of perfect conformation. We either do not comprehend this rule 11 or we must beg leave to dissent from it. Therefore, for the purpose of this lecture we will reject it as a fallacy.

We will suggest to you, gentlemen, and to the breeder of our domestic animals, a few general rules that have suggested themselves to us in our limited research and experience, which may be of some value to those who do not understand the subject better, leaving all to make such additions and alterations as commend themselves to their good judgment.

First, The purer and less mixed the breed, the more likely it will be to be transmitted to the offspring; hence the one of purest blood will, as a rule, be likely to be more strongly represented in the offspring.

Second, As the male and female are each supposed to furnish their quota in the formation of the embryo, each will be represented in it in a great degree, according to the health, breeding, and strength of the nervous system of each at the time of copulation, but as the embryo depends upon the mother for its food, in health and constitutional powers, it will be more likely to be like her in this respect. Yet, since the sire is represented in furnishing a portion of the original germ, the foal will be more likely to be like him in general character and conformation.

Third, The influence of the male and female upon the embryo is partly dependent upon the condition of each and upon the strength of the nervous system of each, and other conditions at time of copulation.

Fourth, Acquired qualities are transmitted same as natural ones, whether they belong to sire or dam.

Fifth, That sire and dam will produce their like or the mixed qualities of their ancestors.

Sixth, The purer and less mixed the breed the more likely it is to be transmitted unaltered to the offspring.

Seventh, Breeding in-and-in is not only beneficial but is absolutely necessary to a certain extent, and it is the only way by which we can regulate the temperament, bodily and mental power, color, and conformation of the offspring with any degree of certainty. Great caution, however, should be used under this rule that it should not be so close as to be incestuous.

Eighth. The first impregnation seems to extend to subsequent ones, and Mr. Stonehenge says upon this subject :

“In the series of examples preserved in the museum of the college of surgeons, the workings of the male quagga when united with the ordinary mare are continued clearly for three generations beyond the one in which the quagga was the actual sire ; and they are so clear as to leave the question settled without a doubt.”

Ninth, We adopt Mr. Stonehenge's Rule 16, “When some of the elements of which an individual sire is composed, and in accordance with others making up those of the dam, they coalesce in such a kindred way as to make what is called a ‘hit.’ On the other hand when they are too incongruous, an animal is the result wholly unfitted for the task he is to perform.

By adhering six to eight generations to the principles of breeding we have laid down, the breeder can to an almost certainty produce a type or family of horses of nearly the same size, conformation, and color.

This is done by high breeding and careful selections. This is not only desirable but profitable. Under these rules it is as easy to breed a black animal as it is a white one, and if you use white, black, chestnut, bay, and brown parents, you will be likely to have ring, speckled, and streaked offspring. If you use nothing but sound, healthy, and vigorous stock for breeding purposes, you will be likely, as a rule, to have that kind born unto you, and vice versa.

We will now illustrate our theory under the rules we have given. Suppose we desire to produce a distinct family of trotting horses, of a uniform color and size, with sufficient bone, tendon, and muscle. We would look about and find a thoroughbred stallion near sixteen hands, with kind and docile disposition and with good knee action. We would like him all the better if he were capable of winning the English Derby ; in other words, would like him to be capable of being a great performer as a race horse, and if he had been tried in the stud and had proved himself a sire capable of reproducing himself or nearly so, should consider him of inestimable value, and besides we would want him broken to harness (our English cousins would consider this a great sin and disgrace), that he might be educated to the new business or purpose for which he and his progeny are about to be used, that he might transmit his new acquired gait to his offspring. We should want him faultless in shape and build, with large knee, large, clean hock, round ancle, sound feet, flat cannon-bone, large around the girth, long arching neck, oblique shoulder, long hip, short back, long underneath, with fine, thin, long, tapering ear, broad forehead, wide between the jaws, fine, small muzzle, fine coat, and of a

rich bay color. Last, but not least, would want him strong in the old English Eclipse, blood like Imported Leamington or his son Lelaps, whose dam was Imported Pussy, who possesses more strains running back to that horse than Leamington himself. This being the great fountain head from whence nearly all our great trotting sires emanated; Membrino, Messenger, and Rysdyk's Hambletonian are among the number.

Then we would, if possible, select the number of dams desired, and of good size, and rather long and roomy, would not care to have them possess the same qualities as the horse, would have them possess good points, good milkers, and strong constitutions. Their blood should resemble that of the stallion, that is, with as many strains running back to Eclipse as is possible to find, with natural trotting action, which is easy to find among thoroughbreds. These mares should be as nearly as possible of a uniform size and color, having in view the progeny resembling each other in temperament, bodily and mental power, color and conformation, so that those not needed for service in stud or on the track could be sold, singly or in pairs, for carriage purposes. Those for breeding purposes we would have trained as before stated, as their acquirements are also to be transmitted. When these colts so bred were old enough to breed, we should look for another stallion of as nearly the same conformation, disposition, color, and breeding as the other as possible without being too nearly related. And so on until we had three or more of these stallions, in order to avoid too close in-and-in breeding. If any of these stallions were not satisfactory as reproducers, we would change for others, and occasionally we should infuse into this family new blood, from the same source but from other localities. By this process, in about six or eight generations, we should expect, barring accidents and unknown causes, to see a family that would not only be nearly uniform in color, size, soundness, and general conformation, but we should expect to see a family of great performers such as the world has never known, and we predict that the fastest time that will ever be made in trotting will be made by a thoroughbred horse bred and trained in this way. What an inheritance such a family of highbred horses would be to the individual and nation. There is nothing new or strange in the principle of uniformity in color; it is fully illustrated by our breeders of sheep, hogs, and cattle. There are numerous families of white, black, red, and mixed, as the breeder desires. Still there are mysteries in breeding we cannot solve, and, as we stated in our opening, the question of breeding is a problem hard to solve, and we think cannot be fully demonstrated.

The rules and principles we have been discussing are only general, but underneath is an unseen, invisible hand that at times disregards all our rules and plans, and a malformation is or may be the result of the best known theory of breeding. Therefore we say that the law that shall make breeding pass from the conjecture to that of a demonstrative science is as yet unwritten. If it were possible to give us a mare that invariably produced the reflex of the stallion no matter how often the stallion be changed, or, reversing the matter, were it possible to find a horse, no matter how many mares he serves, that would invariably impress his own image on his progeny, then the problem would be solved, but that seems to be impossible. Some stallions have this power in a marked degree, and when found are of priceless value, for with them the breeder knows beforehand with tolerable certainty what to expect. We know how certain lines have their own characteristics, and we trace back not so much to the immediate as to some potent ancestors.

The black spots indicate the influence of camel blood. We have a horse that shows these spots. He is a chestnut with black spots, and we have no doubt they run back six generations to that horse. White hairs mixed in the coat indicate the blood of Sir Hercules. Bannyweala never sired more than one or two colts but that these white hairs were plainly visible in them as well as in his own coat.

And this reminds me of an anecdote told by an Irishman who said that Sir Hercules had many colts in Ireland, and that if an Irishman had a colt with white hairs in his coat, he was always ready to swear that the colt was by Ould Sir Hercules or some of his sons. The Morgan horse possesses this power in a marked degree. Any one who has ever seen a Morgan horse can tell one at a glance.

What is wanted of a stallion is the power to transmit his characteristics to his offspring the blood which predominates over that of any other strain with which it is mingled, a potent, masterful blood, filling the veins of those born of it. Such a stallion deprives breeding in a great measure of its uncertainty. The best stallion is he who being good himself surely and closely begets stock like himself, or that of some great ancestor. When you come across such an one, and he being the model strain of blood you desire, ask to see his foals before sending your mares to him. Blood and performance alone do not always indicate a good stallion for breeding purposes.

The influences that compass the breeder, who aims at the best, are numerous and intricate, and in embryology there is a point beyond that has not been pierced by mortal man, a chasm which the most scientific has never crossed, and there are secrets in reproduction that man has never been able to fathom. Among the causes of variation are soil, climate, breeding back, disease, accident, imagination of the dam, and the influence of former pregnancy. One of the most dominant laws is that of hereditary transmission. Prepotency is less frequently the prerogative of the individual than of the breed, long and carefully to a particular type. Hence the value of pure races in imparting to other breeds their own qualities to a proportionately greater extent than the share they had in begetting them. A writer has said "that this grand law of inheritance is a force as uniform in its action, and as invariable as the law of gravity. Like gravity its action is modified and interfered with by opposing forces, which oftentimes disguise its phenomena."

By adhering to the principles advocated they would be of great and inestimable value, and barring accidents and the unfathomable freaks of nature, our stock of all kinds would be improved beyond estimate, in beauty, usefulness, and value. We might here give many illustrations and examples in proof of our position, had we time and were it necessary.

Gentlemen, we will give one, and let that suffice. Suppose we take English Eclipse, who never lost a heat or paid a forfeit, and his superior powers were so generally known and admitted that no person would enter a horse against him, and for this reason he was obliged to retire from the turf; and suppose we take Maud S., who is the queen of the American trotting turf, and the fastest the world has ever known (and she is almost clean cut thoroughbred). Now, why were these two such great performers? Simply because they were more nearly perfect in their entire organization and make-up. The next question is, how did they come so? Was it by accident? Did you ever know, is there one example where a low or common bred horse ever made such performances? Never. The question answers itself—it is by thoughtful and high breeding, and it is as natural as that water runs down hill that as long as we breed up

we will get better; as long as we breed down we shall get poorer. When you find such a stallion as Eclipse, for instance, he has brought to him such dams as Maud S., and what is the result? On the other hand, you have an old, worn out, balky, ringboned, spavined mare, who has the heavens. You don't know what else to do with her on account of her worthlessness, so you conclude to set her to breeding. You look around to find a stallion as worthless, if possible, as she, that it may not cost anything. They are coupled together, and what kind of progeny are you likely to get, as like produces like or the mixed qualities of the ancestors. Then say this process is continued six to ten generations, what kind of a family will you be likely to have? How many Dexters, Maud S.'s, Longfellows, Harry Bassetts, Foxhalls, and Iroquois's would you be likely to have by this process. We know of no example where a low bred horse has ever been able to trot and win a three in five race that was trotted in 2:30 or below.

In two centuries, no low bred horses have ever been able to compete with the high bred horse, and no low bred has ever won the English Derby, or any great event on either continent, and this is now so generally understood they do not even attempt it.

But my farmer friend says he does not want a runner, does not expect a trotter. Let me tell you, dear sir, with the best cold-blooded mare ever born you have no reason to expect a runner in the first cross, even if you breed her to the highest bred and fleetest thoroughbred stallion ever foaled, but you will have more than doubled the value of your colt for almost any purpose, but as we said in the opening, we are not urging the use of any particular type, but when we breed we should breed from the best and breed up—not down. By the advantages of high breeding we shall have animals of greater longevity, more beautiful, more useful, more enduring, and more valuable. Gentlemen, in breeding, beware how you sow tares when you should sow wheat; for as you sow, so shall you reap.

SHEEP HUSBANDRY.

BY HON. HENRY CHAMBERLAIN.

[Delivered at Berrien Institute.]

The gentleman who was to have read a paper on this subject, having learned at a late day that he could not be present at this institute, the committee in charge invited me to write and read a paper.

I was very much inclined to refuse this request, for the reason that I need instruction in this branch of husbandry, and doubt my ability to impart *definite* useful information to you.

In many, if not most branches of industry, the persons engaged therein know definitely or at least approximately the cost of each article produced. It is not so with the products of our farms, our herds, or our flocks. So far as I know, the most intelligent of our farmers are and, perhaps, must be satisfied with a very indefinite and perhaps not even approximate knowledge of the cost of his products.

If the owner of a good farm, stock, and tools succeeds in securing the com-

forts of life for himself and family, and in the course of a life of toil adds something to his estate, he has to be satisfied.

I submit for the purpose of comparison an estimate of the selling value of the live stock raised or fed on the farms of Michigan, and give you the results of my own experience. A horse which at four years old, for a series of years, will sell for one hundred dollars (taking the chances of these animals to unsoundness and accidents), is a full average. At this age, the horse has been pastured in summer and fed in winter fourteen hundred and sixty days (1,460) days, or at less than seven (7) cents a day.

A steer at three years old, fed on grass and hay alone, is a good one if it will sell for thirty-five (35) dollars. This sum is a trifle over three (3) cents for each day, for the ten hundred and ninety-five (1095) days that it has been fed and cared for.

A cow can be made to produce in butter or cheese, including the value of her calf, at least ten cents a day, say forty (40) dollars a year. The cow will consume more pasture, more hay, and small grain to give these results, than will the steer. The labor required in milking the cow, and making the milk into butter or cheese, is more, and the question of profit over colt, steer, pig, or sheep is often determined by the size of the farmer's family. If in quest of profitable employment, there is no doubt in my mind that the cow is now, and will be in the future, the most profitable animal on the farm.

A pig which ought to weigh at nine months, or two hundred and seventy (270) days old, that number of pounds, pays, on an average, about five cents for each day's keep. However, as it feeds principally upon grain, which costs much labor, it is doubtful whether it is more profitable than other animals grown upon the farm.

Last and least in the minds of some, comes the sheep, the animal which it is expected that I will treat upon in this paper. A sheep which will give wool of the value of two (2) dollars, and increase in lambs of the value of one and a half (\$1.50) dollars each year, is usually looked upon as a good one, and is a good one. This is less than one cent for each day for summer pasture, winter food, washing, shearing, and care; a small, very small sum. Yet most of the farmers of Michigan believe it profitable, and keep some sheep on the farm, and some who do expect to realize much for their own labor, believe that sheep are the most profitable animals that can be kept on the farm. The question as to the value of the manure made by animals kept on the farm, is one of great importance. In this regard (not that any one knows certainly perhaps), it is, I believe, conceded that sheep stand first.

I know that many writers on agriculture, especially when they wish to figure out a profit, give a large money value to manure. This is fallacious. No one can increase the productiveness of our virgin soils by the aid of manure. If he is a good farmer, he will not allow it to deteriorate. Hence that which he returns to the soil in order to keep up its productiveness should not enter into the account of profit.

How much does it cost to keep a sheep each year? What money value will it produce? I can answer the last question, and so can all of you gentlemen before me who raise mutton and grow wool. As to the cost of keeping, I cannot answer definitely. I have looked over many hundred pages since I consented to write on this subject, and in the past I have read many thousand columns in regard to sheep; I have asked the question at two annual meetings of the "Michigan Sheep Breeders' Association," and have never found or received a definite satisfactory answer. Can any one in the audience answer?

I doubt whether the very able and successful Professor of Agriculture, who is with us to-day, can do so. But if the State Legislature will make the appropriation to carry out the experiments necessary to know, I think in a few years he will be able to give us a *definite* and *satisfactory* answer. We ought to know just how much it will cost for summer pasture and winter keep. My farm is a strong clay loam, and equal to any in the State to produce hay or for grazing.

In the spring of 1878, I had a flock of sheep which numbered two hundred. The salable wethers had been sold out the fall previous. These sheep were of no particular breed, were medium wool and good size. I summered and wintered this flock, and after shearing sold the increase and the wool, which produced \$670, or \$3.25 for each head for the whole flock, and left the flock in as good condition and of equal value to what they were the spring before. The winter feed of this flock was twenty tons of good timothy hay and the wheat straw from twenty acres. In August of 1878 I purchased forty steers, which were one year old in the spring of that year, at a cost of \$400. Gave them first class pasture until feeding time, and then fed them forty tons of equally good hay and the straw from forty acres, a part of which was wheat and a part oat.

I sold the steers on the first of April for twenty dollars a head, or \$800 for the lot. The steers were cheaply purchased and well sold, sold for more than I considered them worth, otherwise they would not have been sold at this season of the year.

Not taking into account the pasture for the sheep from April 1st to August 1st, the account of feed and profit from same would stand as for each ten dollars from the cattle, give thirty-three and a half dollars for the sheep.

From this experience and general observation from year to year, I am convinced that the winter keep of a steer coming two years old is equal to the winter keep of ten sheep, which will average one hundred pounds to the head.

Sheep require a great amount of pasture, how much to each sheep I do not know. Often they have been pastured on fallows and partly cleared land.

I can carry a steer to the acre on my old pastures, with the use of the rowen for an equal number of acres. I always allow my cattle and sheep to pasture my well-set timothy meadows in the fall, and often turn my sheep on in the spring at the rate of two or three to the acre. This would usually be called bad farming, but careful observation on my farm does not so teach me.

I believe it will take as much pasture for five sheep as for one steer, *but I do not know*. If my estimates are correct, it will take three acres of pasture and hay land for each ten sheep. If ten sheep produce in wool and increase thirty dollars each year, and this I believe is about the average of mine for a number of years past, it will give a gross sum of ten dollars for each acre, not counting the interest on the capital invested in the sheep. This seems a small sum, but we may consider that it is as much as we often receive for an acre of corn, of oats, and sometimes wheat. The investment in labor on the sheep is much less, very much than on the grain crop. I think the net product is better from sheep than any other branch of agriculture, except dairy cows; with them a large part of the value of the product is in the labor.

I have had some experience with sheep for the last thirty-three years. I commenced clearing the farm upon which I now live in 1850. The next year I purchased a flock of sheep after shearing, and pastured them in the newly cleared or partly cleared land. I often bought whole flocks which had run down at low prices. These I would turn to pasture and usually commence in

September to make sales, and continue until feeding time, making drafts from time to time until all the salable sheep were disposed of, then slaughter the remainder for their pelts and tallow. I often netted \$1.50 per head. This was much the best use I could make of the new stumpy land. This plan continued until 1859, when I purchased a flock of fair grade Merinos, with which I used a Southdown ram, getting new rams every year or two. I found sale for my wethers in August or September, after they were a year old, at from \$4 to \$5 per head, usually shearing from the same wethers nearly seven pounds of wool. This was entirely satisfactory, but in a few years I found my aged ewes decreasing in wool, and at four or five years old not shearing over two and one-half or three pounds of wool. Had I known what I now know and bred my ewe lambs the first year, and fattened and sold the ewes at three years old I should probably not have tried the experiment in 1867 of purchasing one ram and five Cotswold ewes at a long price. I tried breeding them pure and cross-bred for several years, and was not satisfied with the result. Had I known enough to have sheared my long wools the last of April or first of May the result would have been better.

In 1872 I had about 600 sheep. They were selections from the flock I had, and similar sheep purchased from time to time. I weeded out the long wools from year to year, and bred from rams of my own raising or similar stock purchased in the neighborhood, and soon had a flock of fairly even middle wools which sheared from four and a half to five pounds of washed wool which brought the best market price. The wethers were sold out in September at two or three years of age at an average price of \$4.50 per head. This on the whole was quite satisfactory, and continued until 1878, when by sales I reduced my flock to 200 head. The breeding was the same until 1880, when, feeling that there was not difference enough made in the price of my wool and the heavy fleeces of Merino, I commenced using high grade Merino rams on the whole flock, which was continued for most of the flock until 1883.

The produce of the merino rams gave me more wool, but when my first crop of lambs came two years old, and I commenced looking for the fifty to eighty wethers and dry ewes to sell at my usual prices, I did not find them. This did not please me. After a careful study of what I thought I needed in the fall of 1882, in company with my brother, we purchased two rams and four ewe lambs, imported Hampshire Downs. These were sheared in April, 1883, and gave eight pounds of wool, each of the ewes raising a lamb.

These lambs were entirely satisfactory. They came about March 1, 1883, and with the same treatment given to my other sheep and lambs will now (June, 1884) weigh 100 pounds each. I also bred one of these rams to ten fine-wooled ewes, and the produce was equally satisfactory, so much so that I had two hundred ewes last fall to these rams and the cross bloods. I am confident that I am now on the right road to breed wool and mutton, and unless it be stock rams, after next fall I hope never again to own either ewe or wethers over three years old. I shall breed all my strong ewe lambs, and those that are not strong feed and sell to the butcher. After breeding the ewes three times, feed and sell them.

I see by the catalogue of the Smithfield Club Show of 1883 (England), that premiums are offered for fat wethers under twelve months old, and for over twelve months and under twenty-four months, and for fat ewes three years old or over; two classes for wethers and one for ewes of each breed or cross-breed. At this show premiums were offered for fifteen distinct breeds and also for cross-bred sheep.

The Champion plate and the Club's gold medal were awarded to Hampshire Downs bred by William Parsons (for the best of any breed), for a pen of three wethers *nine months and two weeks old*, which weighed 642 pounds or *two hundred and fourteen pounds each*.

Of nineteen entries of cross-bred sheep, seventeen were crosses of Hampshire Downs.

At the Norwich, (England), show the first premium was given to a pen of lambs, first cross of Hampshire and Cotswold, at Birmingham, England, to South Downs. What is the future with the Michigan farmers in regard to sheep husbandry? The reduction of the tariff on wool made last winter has, it would seem, alarmed a great number of sheep breeders and wool growers. I am not of the number. I am making my arrangements, and hope in 1886 to own and carry on my farm 1,000 or more sheep.

It is true that wool is nearly the only product of our Michigan farmers which receives any of the benefits so lavishly and bountifully bestowed by the government by means of a protective tariff upon favored classes.

My conclusion is that we must rely upon our natural advantages and try to adapt ourselves to the circumstances which surround us and raise that which the market demands.

The great west is filling up with sheep and they can raise wool on lands which cost the flock masters little or nothing, and with immense amounts of foreign capital, just as cheap as it can be done any *where else in the world*.

Let us who are near to market give our attention to mutton as much as we do to wool. If the tenant farmers of England can keep, as they do, three sheep to every four acres, and raise mutton and wool in competition with the whole world, and pay from ten to twenty dollars an acre for whole farms and keep up all the improvements, I will try to do it upon my farm when I only expect half as much for the use of my lands. I know there is a very common prejudice among farmers to the use of mutton. I fear that much of that which is called mutton is of the kind that I heard a man who had followed threshing describe. He said a farmer, late in the afternoon, would come to where they were threshing and inquire if they would be at his house for supper. If answered in the affirmative he would rush home, and with the help of the boys and dog, chase down a sheep, kill it, and have it for supper. This, brother farmers, is not mutton, it may be sheep. Mutton made from a well fattened and carefully handled sheep is as desirable meat as can be brought to our tables. There is now, and always will be, a demand for good mutton at good prices. Breed your sheep for good mutton and desirable wool and both will bring fair prices and be as little liable to fluctuate in value as any of the products of our farms.

In 1883 my flock produced about 1,500 pounds of wool, 70 per cent of this brought 43 cents, and 30 per cent 38 cents in Boston market. I sold it and received 35 cents for the whole lot at home; while my fine wool ram's fleeces, of 12 to 14 pounds, brought 16 to 20 cents in Boston, I was paid for it at home 20 cents. *The time when grease will bring the price of wool has passed away.*

SHEEP BREEDING.

BY R. S. WEAVER.

[Read at Caro Institute.]

Will Carleton, in his "Festival of Reminiscence," or the "Pioneer Meeting," makes the president of the occasion say: "To help this meetin' long, my eldest son, George Washington, will perpetrate a song." For this same purpose, I am to perpetrate, not a song, but a paper.

I had hoped to have been spared this infliction upon you, as well as upon myself, especially after the inexorable committee of arrangements had assigned me the subject of sheep. Presumably the committee thought that if I had any practical knowledge of any one thing, which was worthy the consideration of his assemblage, it was upon that particular subject, and I, for fear you would think that I knew not much else, and was somewhat fanatical regarding sheep, disliked being made instrumental in affirming your convictions that I was a little off on this question.

This, by way of explanation and extenuation of my offense, that the responsibility of this effusion may rest where it properly belongs,—upon the committee of arrangements.

Without a fertile soil, there can be no successful or profitable farming. This I believe to be an axiom, the experience of agriculturists in all ages having demonstrated the truthfulness of this assertion.

If this position is accepted and we are to be prosperous farmers, then it naturally follows and becomes a necessity, if our lands are impoverished that they be made rich; if they are already fertile, that the fertility be maintained. How is this to be accomplished? Mainly by one of three ways, or by their combination. These ways or means are by the application of what we denominate barnyard manure, or by green manuring, which is the plowing under of clover, buckwheat or any growing crop that for this purpose is thought to be desirable, or by the use of commercial fertilizers. Of these three, undoubtedly the best one for all soils, crops, conditions, and seasons, is the first one named in the list, barnyard manure.

To the owners of lands lying adjacent to villages or cities, perhaps a sufficient supply may be drawn at a minimum price from private and public stables; but the majority of farmers must depend for quantity and quality, upon the number and kind or kinds of domestic animals kept on the farm, their feed, and the mode of handling the manure.

Our farm stock, when properly cared for, are but factories from which much of the profits of the farm are derived—taking the raw material, corn, oats, peas, barley, grass, hay, and the coarser fodders, transforming them into beef, pork, mutton, milk, butter, cheese, and wool (which are readily converted into money), leaving manure the residue in the process of manufacturing, to be applied to the fields, helping them to give in return an abundant harvest to the painstaking and thrifty husbandman.

Which of the different kinds of our farm animals a person should choose as best adapted to his needs might depend somewhat upon certain conditions of the farm on which they were to range; but without stopping to discuss the question as to what the conditions should be, which would best meet the wants and requirements of each separate kind of farm stock, and supposing you are

desirous of becoming acquainted with some of the characteristics of a variety which is as well suited (I am drawing my bow very mildly) to meet all contingencies as any we have, permit me to introduce for your kindly consideration my woolly friends, the sheep.

As we have been speaking of manure as being quite an essential factor of successful farming, we might as well first consider that question in its relation to sheep. That sheep upon feed of the same quality will produce manure as rich or richer in plant food as cattle, horses, or pigs, is a fact which has been demonstrated and so many times proven in the practical test of its application to so-called worn-out soils, that to intelligent farmers it has nearly or quite ceased to be a question of discussion.

Much has been said and written about John Johnson's sagacity in underdraining his worn-out farm. While I would not decry underdraining (for I heartily indorse it) or seek to detract anything from the honors so justly bestowed upon him as the father of underdrainage in this country, yet from those same underdrained lands, but for the aid of the clover seed which he sowed and the rich manure made by the sheep he fed, or by the use of some other fertilizer (which evidently he did not deem expedient for him to do), John Johnson's "crockery" might have remained buried until doomsday and never alone caused those sterile fields to bring forth the abundant harvests which they did to their possessor. When sheep are properly housed and fed in winter without the aid of elaborate arrangements of troughs, pipes, and cisterns, we believe more of the liquid manure is garnered up in the bedding and refuse fodder over which they pass, than from any other of our farm animals. The reason assigned for this opinion is that it is voided by sheep more frequently, but in less quantities, thus giving the absorbents ample time to take it up and retain it for future use. During the pasturing season no animal of the farm distributes its excrement so thoroughly and in a manner which admits of so little loss of its fertilizing properties to the soil or plant as sheep. Their manure is usually dropped in pellets which form naturally causes them to scatter over the surface of the ground, where by action of the rains they are driven down to the roots of vegetation; soon screened from the action of the sun and wind by the extra foliage they have induced, they gradually yield their fertilizing properties until those qualities are exhausted. If sheep are pastured in fields where knolls abound, and upon which the soil is generally unproductive, that, of all others, is the place sought by them to pass the night upon, leaving an extra dressing of manure just where it is most desirable. In contradistinction to sheep in pasture are cattle and horses. They usually mass their droppings, killing all the vegetation underneath them. Exposing the upper portions to the action of the elements, and, through evaporation, losing a goodly portion of its fertilizing properties, and if they are ever found lying on knolls, it is purely accidental on their part, and not from any fixed or natural habit. No animal on the farm digests its food so perfectly as sheep; its mill grinds fine. No grain or seed can pass through its digestive organs and retain sufficient vitality to ever germinate. There are three deductions to be made from this fact. First, if its digestion is more complete than any other of our domestic animals, it must assimilate its food more perfectly, and this would go to prove that it required less food proportionately to sustain life than any other of our farm stock; second, all the nitrogen in its food, or very nearly all, is made available, and this is one reason why the manure is richer in plant

food; third, accompanying the fact that the germinating properties of seeds are destroyed in the process of digestion, is the known proclivity of sheep for a variety in forage, and the combination of these qualities make them at once the most perfect scavengers of the farm. In the bush pastures and neglected fence corners, on the stubbles and summer fallows, they are doing double duty of gaining a sustenance for themselves and helping to clean up the waste places and rid our lands of noxious weeds.

Another distinctive characteristic of good sheep, when they are properly cared for by their breeder (with the exception of high priced thoroughbred breeding stock), is, that if they die the loss, if any, is so infinitely small, that we claim they never die in debt. Dr. Randall, in his report on fine wool husbandry in 1862, very tersely explains this position, and I will use his words. "On no other domestic animal is the hazard by death so small. If it dies at birth, it has consumed nothing. If it dies the first winter, its wool will pay for what it has consumed up to that period. If it lives to be sheared once, it brings its owner into debt to it, and if the ordinary and natural course of wool production and breeding goes on, that indebtedness will increase uniformly and with accelerating rapidity until the day of its death. If the horse or the steer die at three or four years old, or the cow before breeding, the loss is almost a total one."

We find embodied in this statement a fact which must be apparent to all, that sheep commence very quickly paying dividends to their owners in the fleece they bear. This dividend is declared at probably the most opportune time possible for the farmer. Shearing commonly takes place in June, so the clip, which readily brings cash, goes into the market during that month or the fore part of July, a time of the year that on the farm usually there is very little which can be sold to advantage, and when it is very necessary to have means with which to do the haying, harvesting, threshing, and various other kinds of work which are commonly prosecuted during the summer months.

Other direct sources of profit from sheep are in their increase and from those sold for mutton. Until within a few years the English seemed to have been about the only people who have esteemed this meat very highly, but we have discovered lately that it has been gaining reputation, and is coming rapidly into more general use on this side of the waters. Statistics show that in the city of New York there was an increase from 1,228,530 sheep slaughtered in 1875 to 1,769,598 in 1880, showing an increase of about 44 per cent, which cannot be accounted for alone on the hypothesis of the increase of population. This would prove that for a time at least we should have no fears of over-production in this direction. Presumably one reason for the increasing consumption of mutton is that people can partake of it with perfect impunity; Sheep are no breeders of trichina, neither are there any epidemics or contagious diseases among them that in character resembles the so-called "hog cholera" in swine, or pleuro-pneumonia and Texas cattle fever in cattle.

Another consideration which is no small one in this northern latitude where a farmer needs to feed the generality of farm stock about six months out of the twelve, is the fact that sheep without detriment to them, may be turned to pasture in the spring from two to three weeks earlier and may remain at pasture in the fall about the same length of time later than other farm animals. Taking the two extremes of the pasturing season and putting them together we would have from four to six weeks' less time during the year that sheep would need stored food than other stock, which is an item of no inconsiderable importance.

While the fall pasturing of young clover seeding is considered as of doubtful expediency in theory, yet in practice it is quite commonly done. If the clover has obtained a good growth and you *will* feed it, you can turn no stock upon it which will do less injury than sheep. Especially is this true when the earth is softened by the fall rains, as from their lighter weight they do not poach the ground, leaving indentations filled or partly filled with water to freeze, causing the young plant to be more subject to the heaving process of the frosts.

I do not wish to be considered as offering a premium on poor fences, but as a matter of fact it requires the least excuse of a fence to confine respectable sheep of any stock we have. Throwing or pushing down of fences by them is a thing unknown, and the jumping of anything like a reasonable apology for a fence, is a pastime they scarcely ever indulge in.

It is probably needless at this stage of my paper to inform you that in my opinion sheep have many qualities which merit our approbation, and make them a very desirable acquisition to the farm. There are other points of consideration which might be discussed with favorable results to their interests, but possibly you may think if my bow was mildly drawn that it is a pretty long one; if so, remember the aforesaid committee strung it, and I owe you no apology.

One suggestion and I am done. I have endeavored to speed my missile straight for the mark, and fancy my shot is fairly close; but if owing to an obscure vision it has deflected and I am clinging to a delusive dream, it is your prerogative and duty to inform me of the "error of my ways," and help to pull the wool from over my eyes.

FINE WOOL SHEEP.

BY A. CRAWFORD.

[Read at Eaton Rapids Institute.]

After speaking upon the early history of fine wool sheep Mr. Crawford continued: It is said that a man must be born to the business of his life before he can expect success to crown his efforts. The man who expects to achieve success with a choice flock of pure bred sheep, must have a natural liking for sheep. He must never tire in serving them, in all ways that will tend to promote their thrift and comfort, must have patience and perseverance to work out the model, form, and qualities his artist mind must have drawn from the good and fancy points of his flocks around him. In fact he must be a born sheep man ere he can expect to compete with those already in the field.

Now as I have not felt myself competent to care for and improve this class of pure bred fine wool sheep, I have confined my attention to the grade Merino, a very good kind of sheep, and to my mind when properly bred, fed, and handled upon the farm are the best paying property the farmer can keep. They may also be called one of the farmer's best helpers in the fields. In summer how nicely they clear out our fence corners of grass and weeds, our uncultivated lands of briars and bushes, how they nip every green thing from our fellows, and in winter work up our surplus hay, grain and coarse fodder

into wool and mutton to be sold to enrich the farmer, and into manure to return to our cultivated fields to keep up their fertility, thus paying dividends year after year to the farmer, and to his farm in more ways than they are always given credit for.

We frequently find flocks of these sheep that nearly equal the pure bloods in general appearance of form, and of quality and weight of fleece. I believe, however, that there are very many sheep that pay their keepers but very very small profits, if any at all. I have made inquiry of several practical sheep men that have investigated this matter of profits in the keeping of sheep, and they say that they have usually determined that from the value and fineness of the coat they wear. That if it is a six pound coat of clean brook washed wool or its equivalent of unwashed, it will with the average price they get for wool. one year with another, pay the sheep keeping and perhaps something more, leaving the manure and increase clear gain at least after paying in a home market good prices for hay, grain, coarse fodder, and pasturage given him. This calculation is undoubtedly very near the market of profit upon our high priced lands.

Farmers, however, having lands only adapted to grazing or partly improved, might with profit keep sheep that sheared something less. There is also more difference in the values of farms, in the matter of profits per acre, than the salable price per acre. My neighbor's farm, through its natural fertility of soil, gives him more hay, larger yields of grain, and will furnish more pasture to the acre than mine, although, perhaps, owing to buildings or location, my farm will sell for more money per acre than my neighbor's. In that case, with equal labor and expense, he might be able to produce a crop of grain, a mow of hay, or a clip of wool much cheaper than I, as the extra fertility of his land increased his production. He might be able to keep sheep with profit that sheared him but five pounds, while mine must shear me six pounds or even more, to be alike profitable to me. So here we see that everyone must determine this question more or less for himself, after an investigation of his means and opportunities.

My advice, however, would be to those having sheep that do not shear them six pounds of market wool or its equivalent of unwashed, to dispose of them as soon as they can, for you can get them that will, for \$2.50 or \$3 apiece, do that with tolerable good care. In order to secure the best results, keep no more than you have plenty of feed for, summer and winter; shelter them from all the storms of late fall, winter, and early spring. Your sheep will pay you well for your constant care and oversight over them during the whole year. You can hardly delegate this attention to anyone else, but you must look to them yourself, and strive to become proficient in their care and management.

It has been my practice to separate my sheep into several flocks. In the summer I keep my wethers in one field, my yearlings in another, my ewes with lambs by themselves; my dry and barren ewes I turn with the wethers or in a flock by themselves; I also change them about from one pasture to another every week or two, which I think is of great benefit in keeping them in good health and thrift. At the beginning of winter I divide ewes into two flocks, choosing those in the best flesh, feeding them only hay and coarse fodder; my poorer ewes I give in addition grain, once or twice per day, as I have it to spare. My lambs are kept by themselves from the time of weaning, when I commence to give them small quantities of grain till I get them all to eating, when I increase the amount to a proper quantity and continue till they

are turned to pasture in the spring. Wethers are wintered by themselves, feeding them twice per day hay and straw, with sufficient grain, if necessary, to keep in fair condition. All are given water convenient of access. By feeding at regular hours, giving plenty of good water, by looking after each individual sheep, by trimming their feet, tagging off filthy wool, giving salt once a week, and an occasional dose of sulphur with the salt, and many other little attentions, I manage to keep my sheep in fair condition without an expensive grain feed during the winter. I prefer to have my ewes commence dropping their lambs about the 20th of April, and if they are through in thirty days I am well satisfied. I believe I can take lambs, dropped anywhere before the middle of May, provided they have ordinary good mothers, and grow them to good-sized, well developed yearlings, with less loss and trouble than I can March lambs, and make them to every appearance as good at the end of the first year.

The question of washing sheep I would like to have appear to me different from what it does. This last year I made one experimental test of its value by wool sales, and found that those sheep that I washed brought me just thirty cents' worth more wool than did those that I did not wash. Now if this difference would hold good in all flocks, then we had better go back to old times and all wash sheep again. I have tested this matter in a small way for several years, but never so satisfactorily to me as last year when I took out a part of one flock, thirty-three in number, and kept them housed from all storms till after shearing them, which I did just previous to shearing the washed ones, and my experience was that I got just thirty cents more per head for the washed fleeces than the unwashed ones. Either I should have lost thirty cents per head if my sheep had all been unwashed or I should have gained thirty cents per head by washing them if the rigid rule of dockage by weight or price was a just one. With me it made a difference of nearly three hundred pounds. Others might fare differently; your sheep may have more oil, gum and dirt in their fleeces than mine did, and in that case this rule of dockage would not harm you as it did me. I dislike the job of washing sheep for the sheep's sake as well as for my own.

It is a well established fact that if sheep are shorn early in the spring it is productive of an increased growth of wool for that year than if shorn later in the season. How much this difference is has not as I am aware been accurately determined, but fine wool sheep men who have been shearing their sheep year after year very early in the spring claim that they will not get any increase in the growth of wool. "You may get grease, however," after about the 1st of May upon unshorn sheep, but that you actually get nearly six weeks more growth for the year's clip upon sheep shorn the first of May than upon those sheared the 15th of June, about the usual shearing time here. This plan of early shearing for all our flocks, if found as it is represented, ought to be adopted. I certainly could show you nice looking fleeces, those freer from grease and dirt taken off the 1st of May than at any later time, fleeces that ought not to be docked very much if any to bring them on an equality with those washed and shorn the middle of June.

I fear I have already tired you with the length of this rather uninteresting paper, but permit me to say in brief that though it is said that there is no form of labor that has so little profit in it as that of farming, that the farmer works early and late, and often late into the night, that he is a hard task master to his family, that he often lives on wheat he can not sell, that he wears the cheapest and shoddiest of clothing, that his buildings and stock are

often none of the best, that his hands are hardened with toil, and his frame bent and stiffened with premature old age. All this and more is being done away with, through the influence of some of our noble-minded, progressive citizens by thus bringing us together and discussing other interests with us, and I see in the near future a new era for the farmer, when he shall labor less but with more profit, when the tasks of his family shall be easy and pleasant, when they live on and wear the best of his raising, while with vigorous step and form erect he labors with increasing knowledge for his social, moral, and intellectual improvement.

POULTRY.

BY H. A. DANIELS.

[Read at Caro Institute.]

The subject of this paper is generally considered by the farmer as one of the most insignificant adjuncts of his wealth, but there are thousands of dollars spent every year for eggs and dressed fowls in the United States. France exports thousands of dozens of eggs to this country yearly, and a little more attention paid to our own fowls would at least produce enough for home consumption. There are sixty varieties of fowls. In all poultry shows, the most conspicuous are the Asiatics; this includes only very large, densely feathered fowls, without power of flight, small tails, and feathered legs. The Cochins form the most prominent sub-group, and are distinguished by their large, low-set bodies, short necks, and single combs. The black, white, buff, and partridge are recognized as distinct varieties. Of the Brahmans there are two, the light and dark. They are marked by more style; though not heavier, they appear larger than the Cochins. There are also the new mammoth breed of Langshans, which resemble black Cochins. These are valued as winter layers, grow rapidly, have inferior flesh, yet are valuable in crossing with other breeds to get size and weight for market. The Spanish consists of black Spanish, Minorica, Andalusian, white and brown Leghorn. They are distinguished by their large single combs and proud carriage. They are persistent layers of large white eggs, and are chiefly valued for this quality. The Leghorns are my especial favorites as a fowl for the farmer. The Hamburgs are small fowls, with full, rose combs, and slate-colored legs. There are five varieties, distinguished by the markings of their plumage. They are good layers of small eggs. The Polands have large top-knots. There are four varieties. They lay a medium sized egg and rarely sit. The French breeds consist of LaFleche, Creveceur, and Houdans. They are large sized, excellent flesh, and good layers of medium sized white eggs. The Dorkings are two kinds, the gray and white. They are bred as table fowls, the flesh being excellent, the breast full, and they are of large size and quick growth. The Games are composed of twelve varieties, and are highly prized on account of their hardness and pugnacious qualities; they are fair layers and not bad to sit. The Bantams are composed of seven varieties, and are mostly kept to please the children. There are six varieties of turkeys, with which I have had all the experience I ever wish, though many farmers consider them profitable.

There are six varieties of geese, of which the Toulouse is probably the best. Of the ten varieties of ducks, I like the Pekin, they are large, white, and great layers.

In regard to the care of fowls, the cheapest way is to have their feed where they can have access to it at all times. A morning ration of ground feed, with corn at their pleasure, will insure eggs in plenty except in the coldest weather. I have found boiled oats three times a week to be eagerly eaten. Pure water daily is as essential as food. Fresh meat once a week during the winter season is eagerly eaten. A load of gravel where fowls can have access to it will disappear before spring. The walls of the poultry house painted with gas tar, also the perches, will insure freedom from vermin. Copperas placed in their drink is an aid to health.

Fifty Leghorn fowls, with proper care, will pay for their feed and return fifty dollars to their owner yearly. That is as great a number as can be profitably kept by one farmer.

BEES AND BEE CULTURE.

BY A. B. CHENEY.

[Read at Grand Rapids Institute.]

MR. PRESIDENT, LADIES AND GENTLEMEN,—The above topic covers such a large field that I shall only be able in the brief time allotted me to briefly sketch an outline of some of the more important matters involved in bee-culture, avoiding matters of mere detail. This will quite likely be most satisfactory to you, as few present have more than a passing interest in this pursuit. We will briefly consider

WHO SHOULD KEEP BEES.

The bee-keeper, to succeed, must be a person who will acquaint himself with and bring to his aid all the wonderful improvements of the last twenty-five years. As the farmer who uses the ancient sickle to reap his grain, or the wooden mold-board to turn the soil must fail, so the bee-keeper who fails to bring to his aid the movable frame, the extractor, the smoker, honey knife, etc., will find himself far behind the intelligent apiarian of to-day.

KINDS OF BEES.

My experience has been confined to two varieties, the common black bee and the Italian. After ten years' trial, I fail to discover any marked superiority of the Italian over the black. Each variety has its peculiar characteristics, which, under certain conditions, may be of advantage and other times injurious. To illustrate: The Italian clings to the comb with greater tenacity and does not become frightened as easily as the black bee when the comb is removed from the hive. This enables us to find an Italian queen much more readily than a black one. On the other hand, in removing frames of honey for extracting, the Italians are much more difficult to shake or brush from the comb. Again, the Italian will venture out in unfavorable weather and many will thereby be lost, while the black bee is at home in safety. I am inclined

to consider a cross between the two varieties as more profitable than either, unless a person has the time to develop a superior strain by careful breeding.

HIVES.

A movable frame hive is a necessity. The movable frame was patented by the Rev. L. L. Longstroth. The patent having expired, any one can use it without expense. This, I believe, is the only patented feature of a bee-hive of any value to the bee-keeper. A simple box with frames hanging inside is, without doubt, the best known receptacle for a colony of bees. A patent hive may safely be known to be a poor hive, and the more patented features it has the poorer hive it is. A patent hive is worth but little for any thing except to set hens in. If you find any drawers, hinges, doors, windows, slides, or moth-traps in a bee-hive, be assured it is only good for kindling wood. The shape of the plain box for receiving the frames would be determined somewhat by the plan of management determined upon. If it is intended to produce extracted honey, perhaps a frame about one foot square would be as good as any, but if comb honey is preferred, a shallow frame, say about nine inches deep and sixteen inches long, would be better; and as the shallow frame answers very well for extracting, I advise its general use. In practice we find so much inconvenience attending the use of different sized frames that we are fully persuaded that only one form should be used, uniformity of size being almost indispensable.

LOCATION OF APIARY.

A sheltered situation in a valley is much to be preferred rather than on a hill. Shade is desirable in the hot weather of July and August, but not in spring and fall. Nothing better than wide-spreading fruit trees can be found, a large apple tree furnishing ample shade for from eight to twelve colonies.

SIZE OF APIARY.

In an ordinary location, fifty to seventy-five colonies will usually yield better proportionate returns than a larger number. As white clover and basswood are the principal honey-producing flowers in this section, a location where these abound is very desirable. The bee yard should be protected by high, tight board fences to protect the bees from high winds, or hedges of ever-greens will prove admirable shields against the winds.

COMB FOUNDATION.

This article is a valuable acquisition. It enables the bee-keeper to secure straight, all worker comb. These advantages are only realized by the experienced apiarian.

Two kinds are in use, the thick and the thin; the thick for the brood chamber and the thin for use in the section boxes for surplus honey. It is made by running thin sheets of wax between two steel rollers, the surfaces of which are engraved in such a manner as to form the bases of the cells. The bees building out the cells on each side of the sheet.

COMB AND EXTRACTED HONEY.

If all people were acquainted with the relative merits of comb and extracted honey very little comb honey would be produced, as extracted honey is more wholesome and furnishes more sweetness than comb honey, and when we con-

sider that the extracted can be produced for about 60% of the cost of comb honey we feel satisfied it will largely supersede comb honey. One hundred pounds of extracted honey can be obtained from a colony as easily as sixty pounds of comb honey, this is readily understood when we inform you that a colony of bees will gather fifteen pounds of honey in the time necessary to build one pound of comb, and as one set of combs will last many years, the production of extracted entirely would nearly double the annual yield, modified only by the amount of extracted now produced.

If a person desires an increase of colonies by natural swarming, he will secure such increase much more rapidly by managing his bees for comb honey. In extracting, the swarming impulse is quite generally destroyed, and very few swarms will be cast in a yard employed in producing extracted honey.

HONEY FOR MARKET.

Very valuable improvement has been made in the last few years in preparing honey for market in a neat form, and in packages suiting the customers. The one pound section and pails for extracted honey are now the popular styles and answer the demands of the market. A half-pound section is used by some, but it seems to be too small for general use.

WINTERING.

This is the great question of questions with bee-keepers, "How best to winter the bees?" I have tried outdoor, chaff, hive wintering, wintered in clumps, and in the cellar, and deem a good cellar the best place. It should be so arranged that it shall be entirely dark, of an even temperature, say from 40° to 45° above zero, and with proper ventilation to secure a sufficient supply of fresh pure air, these conditions are essential. Much discussion is now being had as to the effect of pollen and dampness in wintering, and without doubt new facts will be established. I have used cellars exclusively for six years past, and have suffered an average loss of about ten per cent. of my stocks each winter. This loss might have been reduced had I been situated so as to have personally supervised their preparation for winter.

YIELD OF HONEY.

As honey is the principal object for which bees are kept, you will doubtless desire to know what amount of honey is usually obtained from a colony of bees.

From forty to eighty pounds of surplus honey per colony is generally secured from apiaries well managed. Last season was about an average season with us and our colonies averaged sixty-seven pounds each; one hundred and fifty colonies used in the production of honey, giving us ten thousand pounds of surplus.

Thus I have very briefly outlined the general plan upon which I have managed my apiaries. The practical bee-keeper will find nothing new in the matter presented in this paper, but as many of you are not experienced in this occupation, a general consideration of the most important features of it will doubtless interest you more than the discussion of some technical points which would please the experienced operator only.

At the close of Mr. Cheney's address, Mr. Cobb gave a few of his ideas about bee keeping. He said: "Every one must have a definite system in keeping bees, and follow it closely. By placing surplus hives near a full

hive, the bees are induced to leave the old hive and fill the surplus boxes, and make a strong colony, while the old hive, which has few bees and plenty of brood, will not swarm."

Mr. Hildreth stated that he used larger hives and frames to avoid the work of taking out honey very often. A large hive is well adapted to the use of farmers who cannot spare much time for the care of bees during the honey season.

"I consider the chaff hive preferable to any other, and have never lost any bees from using it."

To increase stock rapidly, Mr. Cheney said: "I start nuclei with one or two queen cells, and a few bees. I keep adding from strong hives brood that is nearly ready to hatch."

To the question "How much territory do you allow bees?" he replied: "One hundred stock of bees will generally take all the honey in the surrounding country, for a distance of two miles."

BEE KEEPING IN CONNECTION WITH FARMING.

BY T. F. BINGHAM.

[Read at Otsego Institute.]

In response to a request from your honorable committee that I should furnish a paper on the above subject, and that it should be instructive, I have decided to give a brief outline of my own experience in keeping bees, which, while it may not be very interesting may be instructive.

I will begin by saying that bees have been kept in our family continuously more than one hundred years. My grandfather on my mother's side was a farmer, and kept bees very extensively. The fact that he gave my father, who was also a farmer, his first stock of bees, is evidence that he regarded bees as a valuable aid to agriculture. As my father kept the same race of bees a period of fifty years, it may be reasonably inferred that they were not only pretty well kept, but regarded as valuable property.

I have kept bees all the time since 1862. I began with twenty colonies, bought and increased to 200 in two years, in Western New York. When I began, honey was plenty and cheap, but during the war, honey in fine shape and of fine quality, sold promptly at from 30 to 45 cents per pound, while beeswax was quick sale at from 85 cents to \$1 per pound. Since that time both honey and wax have declined in price, till from 6 to 25 cents per pound is the usual rate. Honey, when in fancy shape, is strictly a fancy article and does not depend upon the price of other sweets for its market value. Fancy honey is its only competitor.

Fourteen years ago, when I came to Allegan, I found bees plenty all through the county, among the farmers, and they all said that bees did well with them. There were no exclusive beekeepers then in the county, but there were a great many bees. Alanson Weeks, of Allegan, probably, was the nearest to a special beekeeper, of any man in the county, having fifty or more colonies, and giving them special attention and skillful care.

I obtained bees of Mr. Weeks and others to start my apiary of forty colonies, and bought sixty more colonies the following year, and had a fine yield of honey, which I sold at thirty cents per pound. Bees did well, and wintered well for several years ; but at last winter loss set in and my 150 colonies all died but nineteen stocks, the winter following the Chicago fire. The next summer these nineteen colonies were increased to 100, and some honey obtained. The winter following 80 out of the 100 came through in fair condition, and were taken to Abronia, to gather honey from the basswood, which at that time was about five per cent of the timber within two miles of the station. That summer my honey brought over \$1,500, and my bees were increased to 186 colonies. The winter that followed killed all but twenty-two colonies. As there were some bees left about the county, I bought a few, and increased up to 186, my former number, but obtained no honey to sell that year. The winter that followed reduced the 186 to two colonies, and cleared the woods and the farmers of bees. This was my great loss—no bees to increase, and none in the country to sell.

I then bought bees in Kentucky, to breed from, and when fall came I had 125 good colonies, which I took to Tennessee to winter. They wintered well, and I brought back as many as I took away, but they were injured in transit, and were not of much profit that season. In the autumn I took them again to Tennessee, and made some changes in shipment, hoping to be able to make the shipment of bees a paying method of wintering. But, like the previous trial, it did not pay. I then devised the plan I have since pursued, and tried the experiment with sixty colonies, composed of all the bees and honey that were in 125 fine stocks. With some losses every year, and one winter about thirty per cent, I have been able to receive a fair income from my bees every season since.

There are now several extensive bee-keepers in the county, and many in the State. Probably there are more bees in the State now than ever before, but they are in the hands of enthusiastic bee-keepers mainly. If there had been no zealous bee-keepers to have bought and increased their bees, the disastrous winters above mentioned would have left the State of Michigan beeless. The ruthless ax has swept much of the old bee pasture away, and in that respect bee-keeping is not as sure of net returns as formerly. Still, a few colonies of bees will do fairly almost anywhere in Michigan. Large apiaries, however, are frequently more than will do well in one place. Bees, like other stock, must have fine pasture and wide range to do well. White clover is now the main plant on which bee-keepers depend for their surplus honey, and this is steadily improving as the farms grow older. So it is not probable that bees will ever be more restricted in their means of support than now.

You are all practical farmers, and I know will all wish to know if bees will pay a farmer. Now, that is a question hard to decide. The present plan of keeping bees requires an expense of about \$30 to begin with. It then needs enthusiasm and a studious, observing habit of mind. It is not of much use for old men to begin bee-keeping. Their habits are formed, and while they have good judgment they do not readily acquire such skill as is requisite to the profitable management of bees. Young farmers may reasonably hope to succeed in keeping bees if they are studious and determined. Bees are not an exception to other stock. They must have good care and good pasture.

A colony of bees well managed, will, as a general rule, net about as much money as an acre of wheat. And as an acre of wheat represents land and tools, it will not be difficult to see that in other respects they are much alike.

There are men who will tell you that bees yield fabulous profits, and they are honest. But I have long watched the reports, and while we sometimes hear of tremendous yields of honey in some locality, we frequently get no report from the same section the next year, although the season may be a fair one. Bee-keepers are no way an exception to other people. If they get a big yield they do not put their light under a bushel; but when only a fair yield is obtained it is a hard matter to get even a report. Women are not the sole possessors or owners in fee simple of all the vanity the world possesses.

Keeping bees is in one respect unlike farming, viz.: a farmer may raise 100 acres of wheat on his farm and his neighbor just across the road may raise 100 acres too, and so on indefinitely among all the farmers; and yet each one will raise just as much wheat as though his neighbor did not sow wheat at all.

In Michigan several bee-keepers have tried to keep bees as a special and exclusive business; but as their families grew larger some other business became a necessity, and now, I think, it may be safely said that there is not a special and exclusive bee-keeper in the State.

AGRICULTURE IN OUR FOREIGN COMMERCE.

BY G. H. HARROWER.

[Read at the Otsego and Chelsea Institutes.]

I propose to speak of the foreign trade in the surplus of our agricultural products. I shall treat the subject both historically and in its present economic and political aspects. The importance of this branch of our export trade cannot be over-estimated. In the year 1882 our exports of merchandise amounted to the sum of \$733,000,000, of which cotton, breadstuffs, provisions, and live animals made up more than \$536,000,000. While iron and steel, in all forms, amounted to only a little more than two per cent. of the total values sold abroad, and oils to about seven per cent.; agriculture, in the items mentioned above, furnished seventy-three per cent. It is the products of the farm that pay by far the greatest share of our annual indebtedness for goods imported from abroad. Again, as compared with the home demand, the foreign demand is large and deeply concerns American agriculture; for, while the figures are not so striking in other items, we have recently been sending abroad about one-quarter of our wheat crop and seven-tenths of our cotton crop. A knowledge of the facts of so great a trade is necessary to an understanding of the character and conditions of our foreign commerce. Especially at the present moment is this true, in view of the recent action of European governments in regard to the matter. The rapid increase of American competition is viewed with alarm in many quarters, and various means have been resorted to against this rival. Taken also in connection with our own high tariff policy, the export trade has given rise to no little economical discussion among European statesmen and economists. There have been prohibition of trade, commissions of inquiry, "Fair Trade" leagues, and diplomatic correspondence.

While I speak congress and the newspapers are discussing the question how to overcome certain difficulties that France and Germany and other

European governments are putting in the way of a part of this trade. They say that our swine products are dangerous to health, and have determined to shut them out, whereas we are quite sure that their assertions are groundless, that they put them forward simply because they dare not avow their real object in prohibiting the importation and thus making food dearer than it otherwise would be. What is the true explanation of such action on the part of foreign governments will appear later on. That action is regarded, and rightly regarded, as a serious blow at our foreign commerce. It not only checks the natural overflow of a considerable portion of our surplus products, leading to a healthy regulation of prices; but it also threatens to deprive us of a means of meeting a large part of our indebtedness abroad. That is to say, if we buy we must sell, just as the reverse is true, that if we would sell we must buy. In the long run, our exports pay for our imports. Now, in an average of recent years the value of our swine products exported amounts to over 80 millions of dollars per annum. It is this vast item against which foreign attacks are being made. It is not strange, then, that congress is talking of various schemes by which to bring about the removal of the restrictions or prohibitions of this trade. It will be convenient to postpone this topic for the present and at once take up the growth and present dimensions of the trade under review.

HISTORICAL REVIEW.

Raw cotton has for eighty years been an important item in our list of exports. Sixty years ago the value of the average annual exportation was more than twenty-five million dollars. From 1835 to 1850 in only three years did the exports of cotton fall below fifty millions; while at the latter year it had risen to seventy-two millions, and in the next year, 1851, it rose with a bound to one hundred and twelve millions. The civil war greatly checked this trade, but with marvelous rapidity it recovered after the restoration of peace. The greatest crop before 1859 amounted to 3,500,000 bales, but under the better conditions of freedom of labor brought by the war and emancipation, the culture of cotton thrived so amazingly that in 1882 there was harvested a crop of over 7,000,000 bales*—just about twice as great as any crop before the war.

Of the enormous crop of 1882 the value of the exports amounted to \$247,000,000. This one item alone constituted over 30 per cent. of our total domestic exports.

We sell every year to foreign buyers about 70 per cent of our whole cotton crop. Indeed, ever since the great stimulus to this branch of agriculture given by the invention of Whitney's cotton gin, with scarcely any exception, we have disposed of two-thirds of our production. In the year 1840 the exportation rose to nearly 85 per cent.

Next to America in supplying the world with this important staple come India, Egypt, and Brazil, but a long way behind; for two-thirds of the raw cotton worked up in European factories is the product of our southern plantations. England is by far the heaviest buyer of this, as of all our raw materials. The statistics of the Treasury Department for 1882 show that English merchants took fully 70 per cent. of all raw cotton exported. A small part of this passes through English dealers as raw material to other nations of Europe, though by far the greater part is first subjected to one or

*This was an advance of 29 per cent over the previous year, when 5,500,000 bales were harvested. Of this latter crop, which was a short one, over 3,500,000 bales were sent abroad, the exports being valued at \$200,000,000.

more processes of manufacture. England buys only one-third as much of this material from other cotton producers as from us. Her government is making constant efforts to stimulate the culture in India, but it will be many years before any very formidable competition is to be looked for in that quarter.

The next largest item in what we send abroad is wheat, both in the grain and in flour. During the year ending June 30, 1883, we sold to the amount of \$174,703,830. The facts of this trade are most remarkable, and have excited universal attention. Of our cereals wheat is easily king in the export trade. For two hundred years we have had a surplus to sell, the only exceptions worth mention occurring in the remarkably short crops from 1836 to 1839, in consequence of which we imported wheat from Germany and Holland. For sixty years wheat has been a leading factor in settling with foreign nations for our imports. The total amount of our exports of wheat and wheat flour for the sixty-three years ending June 30, 1883, was over 2,000,000,000 bushels; but more than one-half of this was sent during the last eight years. Expressed in money values the amount was over \$26,000,000,000 dollars.

About one-fifth of our wheat export is now in the form of flour, but these proportions have existed only in recent years. Up to 1840 over 90 per cent. was in the form of flour. Grain shipments then began to show a large relative increase, and for the fifty-five years closing with 1875, of the total exports of wheat, nearly one-half was in the kernel. In 1880 flour formed only 15 per cent., but it has since risen slightly above that.*

The recent increase in flour exports, viewed by itself, has been very striking, and some have been led to prophesy that we should once more do the greater part of the milling of our surplus wheat on this side of the Atlantic, but a study of the statistics of the trade will show that it is uncertain business, basing predictions upon the gains of any short period. It appears that "the gains and losses have, from year to year, been playing a sort of seesaw game. * * * That the American milling trade is developing very rapidly, admits of no question; and with this growth there will doubtless continue to be a steady gain in the amount of flour yearly put upon the European markets. One of the most potent causes of the growth of the export flour trade * * * is the improvement in the science of milling in this country," by which "our millers have adapted their flours to the wants of the old world,"†

The value of our wheat crop is very much less than that of the corn crop, but the value of corn and corn meal exported, does not much, if at all, exceed one-fifth of that of the wheat exported. However, it is next in importance, and is, in itself, very considerable. As in the case of wheat, so here the growth has been most remarkable in the last eight years, the aggregate value for that period exceeding by over a hundred millions that of the preceding fifty-five years. Perhaps this gain is partly due to the patriotic efforts of the Secretary of State to introduce the American hoe-cake and Johnnie cake to our European friends by means of the corn lunch counter he was reported to have set up at the last Paris Exposition. In 1881-82 we sold abroad, in the form of bacon, hams, lard, and mess pork, to the amount of \$82,500,000. This is properly to be taken into account in estimating our exports of corn. Of corn and corn meal we have recently sent abroad to the amount of about \$50,000,000 yearly.

* I am indebted for many of the facts stated above, and in other parts of this paper, to an article entitled "Our Exports of Breadstuffs," which was published in the *International Review* for November, 1881.

† From the article already referred to, "Our Export of Breadstuffs."

I can only briefly refer to the remaining items in the account. We sold butter and cheese in 1881-2 in value \$17,000,000; salted beef, \$4,000,000; other preserved meats, \$4,250,000. The exportation of cattle and fresh beef is a recent venture, and the trade has thus far been almost entirely with England. The Treasury Department report on the commerce of the world, issued this last year, shows that the values of fresh beef exported, rose from \$12,000 in 1874 to more than \$9,500,000 in 1881. Present indications are that this will be far surpassed this year. England took from us in 1878 (the first year for which the figures appear) eight million dollars' worth of horned cattle. The amount was eighteen millions in 1880; and though the condition of our cattle ranges caused a great falling off the next two years, during the past year the exportation has nearly equaled that of 1880.

TRANSPORTATION.

One of the most important features in our export trade is transportation facilities, and this for two reasons: 1st, the great bulk of the products to be moved as compared with their values; and, 2nd, the enormous distance traversed. Improvements in means of carriage have made this trade possible, and it will be maintained and enlarged as this last item in the cost of the marketed products shall be still further reduced. The great canals, notably the Erie canal, the shipping of the lakes, the vast railway system, the great trans-atlantic fleets, are the arteries of traffic. For their development, management, and improvement, the quickest minds of the age are constantly working. Progress has been in two directions, the cost and the time required to reach a market, both of prime importance in establishing and maintaining trade. Some interesting facts in this connection may be cited from a recent report issued by the Bureau of Statistics at Washington:

"These improvements in transportation have * * * been made chiefly during the last fifteen years. During that period the foreign commerce of the country has much more than doubled. This is shown as follows: The total value of the exports of merchandise from the United States increased from \$281,952,899 during the year ended June 30, 1868, to \$823,805,819 during the year ended June 30, 1883, and the value of the imports of merchandise into the United States increased during the same period from \$357,436,440 to \$723,122,666.

"Only about eighteen years ago it was regarded as problematical by the managers of the principal east and west trunk lines whether grain could be profitably hauled from Chicago to New York by rail in competition with the lake, Erie canal, and Hudson river route. But during the year 1882, about 80.2 per cent. of the total receipts of grain at Atlantic seaports of the United States was by rail, and only 19.8 per cent. by lake, canal, and Hudson river. Even as late as the year 1869 the rail rates from Chicago to New York ranged from 30 to 42 cents per bushel, but during nearly nine months of the year 1882 the established rate was only 25 cents per 100 pounds, or 15 cents per bushel, and this rate appears to have been regarded as fairly remunerative. The average rate for the year was only 14.6 cents per bushel.

"During the last five years, 34.83 per cent. of the shipments of wheat, 87.18 per cent. of the shipments of flour, and 30.14 per cent. of the shipments of corn from Chicago towards the east were by rail." It is true that at no time has the all-rail rate to New York been as low as the lake-and-canal or the lake-and-rail rate, but in many cases the superior swiftness of the all-rail

transportation has made it an advantageous method to employ. For Philadelphia and Baltimore this was of course the natural method of shipment.

Mr. Nimmo, the chief of the Bureau of Statistics, publishes a table showing the average yearly rates per bushel on wheat shipments from Chicago to New York, by the three methods of transportation mentioned above, during a period of fifteen years, beginning with 1868. By lake and canal in that year the freight charged per bushel was 25.3 cents; by lake and rail 29 cents; by all rail 42.6 cents. In 1882 they had reached, through successive reductions, by lake and canal 8.7, by lake and rail 10.9, by all rail 14.6 cents. Speaking roughly, there was in that time, in all three, a cutting down of charges by 66 per cent. from the rate of 1868. This is certainly a remarkable example of the stimulating effects of free competition. The cheapening of freights has been greater than was thought of in the early grange agitation. Mr. Nimmo thinks "it is not probable that during this entire period [of 15 years] the carrier has been able to realize much more than a narrow margin of profit." It should be remembered that during this time a large part of that consolidation of trunk lines that is so much talked of has been accomplished, and this has greatly lessened the expense of managing the railways, and so made possible reductions in freight rates. What counterbalancing evils may be involved in this concentration of railway interests, it is aside from the present purpose to enquire. There has also come about a vast improvement in the general equipment of railways within the period alluded to, and this, together with the enormous increase in the volume of traffic, has contributed to the reduction of rates.

Mr. Nimmo states that "from 92 to 95 per cent. of the grain received at the ports of Portland, Boston, New York, Philadelphia, and Baltimore during the year 1882 was the product of the Western and Northwestern States;" which shows very clearly the main source of supply for the larger part of our exports and the importance of cheap freights.

One fact is very significant as showing the preference of shippers in general for railway transportation. From a recent publication of the Bureau of Statistics it appears that while the tonnage of the New York State canals fell from $6\frac{1}{2}$ million tons in 1868 to $5\frac{1}{2}$ millions in 1882, the tonnage of the New York Central railroad system rose from 1,800,000 tons to 11,000,000. Of a total movement of wheat to the seaboard in the latter year amounting to 186,000,000 bushels, $11\frac{1}{2}$ millions went by the Mississippi route, $34\frac{1}{2}$ by lake and canal, and 140 by rail.

The ocean rates on grain from New York to Liverpool show no such remarkable reductions as those just cited. In 1866 wheat was carried for 9½ cents per bushel; during the past year (1883) for about 9 cents; though between those years down to 1881 the rate ruled above 10 cents, and in a single year (1873) rose to over 21 cents. "The reductions in the cost of transportation upon the ocean," to note again from Mr. Nimmo,* "have been mainly the result of the increased size of steam vessels, the economies effected in the use of coal, and the reductions which have been effected in the proportional amount of space occupied by coal, boilers, and engines, whereby the space available for passengers and freight has been correspondingly increased."

Within the period already referred to there were similar reductions in the freight charges on the Mississippi boats.

* Preliminary report on the Foreign Commerce of the U. S., Aug. 6, 1883, p. 15.

The shipments of wheat from the port of San Francisco have within a short time approached those from the port of New York. Within five years these shipments have doubled in value (for the year ending June 30, 1878, \$17,000,000; for the last fiscal year, \$37,000,000). It is noteworthy that this has been accomplished in spite of a higher scale of wages on the Pacific coast, and nearly twice as high freight rates in getting the grain to the Liverpool market. Shipments are made by "sailing vessels of the largest size which pursue long voyages in various parts of the globe as the maturing of the crops in different countries and the exigencies of trade in the principal seaports may demand. These vessels, which in the course of the year usually circumnavigate the globe, arrive at the ports of California and Oregon, chiefly from ports in Europe, Asia, and Australasia. The average time of the voyage from San Francisco to Liverpool is about one hundred and twenty-five days."* In that time they traverse a distance of about 16,000 miles. A slight calculation will show the advantage of water carriage over land carriage in point of cheapness. The current rate by rail from Chicago to New York gives an average of $5\frac{1}{2}$ mills per ton per mile; the rate from New York to Liverpool 87-100 of a mill per mile; from San Francisco 83-100 of a mill.

There are three other possible outlets for the products of the Pacific coast that may be mentioned: (1) by the Northern Pacific Railroad Lake Superior; (2) by the Southern Pacific Railroad to New Orleans; and (3) by a ship canal through the Isthmus. The last, when made available, will no doubt be the most advantageous route.

Two or three further points of interest occur in connection with the transportation of these products to the foreign buyer.

First, a word as to the chief shipping ports and the relative amounts shipped from them severally. New York City, the commercial center of the country, easily leads with receipts of grain and flour: and these may be fairly taken to represent the proportions of other commodities, except cotton. In 1880, flour and grain to the amount of 338 $\frac{1}{2}$ million bushels reached the seaports of New York, Portland, Boston, Philadelphia, Baltimore, and New Orleans; of which 165 millions, or almost exactly one-half, went to New York. Baltimore came next with 61 millions; then Philadelphia, 49 millions; Boston, 37 millions; New Orleans, 23 millions; Portland, 2 $\frac{1}{2}$ millions. There has been great competition in this matter between the various ports, and railroads have vied with Boards of Trade in seeking to divert as large a share of grain as possible to their respective seaports. The importance that the great State of New York attaches to this is seen in her recent vote to make the Erie canal free of tolls. This action no doubt was hurried by the prophecies of success for the efforts of rival lines of traffic. Canadian observers are attributing to this new policy of New York the falling off in traffic through the Welland canal, which is said to have been very marked the past year. Be this as it may, the lead that New York City has as a shipping port seems to illustrate the Scripture doctrine that to him that hath shall be given. She is increasing her lead; the 50 per cent. of coast-bound shipments in 1880 had grown to over 61 per cent. in 1882; and this, too, although the short crop had reduced the total receipts at the ports above named to fifty millions less than the receipts of 1880.

* Prelim. Rep., etc., p. 17. The following statement is of interest in this connection: "The value of the wheat crop of California, Oregon, and Washington Territory during the season of 1882 amounted to \$44,700,000, whereas the value of the precious metals produced by mining operations in the same section of the country amounted to only \$17,750,000."

It was long a just complaint concerning New York, that terminal facilities were insufficient, and terminal charges were a heavy burden; but great efforts have been made to correct these evils, and it would seem with success.

The enormous dimensions of freight traffic at that point is seen in recent proposals to construct a vast system of tunnels through the city and under the waters that form its harbor. This may prove to be nothing more than a visionary scheme, yet it would hardly be surprising if by 1894 ten or fifteen miles of such works were in operation.

Another important question arises in this connection, i. e., as to the share of our own merchant marine in the vast carrying trade which these exports involve. The answer is short and humiliating. A recent report of the New York Chamber of Commerce shows that of our total foreign tonnage only about one-sixth is carried in American vessels. This industry has suffered a constant disastrous decline for twenty years. In 1855, 73½ per cent. of our foreign trade was carried on under the American flag; in 1861, 41.4 per cent.; in 1867, 33.9 per cent.; in 1878, 22.6 per cent.; in 1880, 17.4 per cent.; in 1883, 16 per cent. And yet our ship building is so thoroughly protected that it is forbidden to sail a foreign-built ship under our flag. The greatest share of this trade is done in English ships, and yet English ship-wrights are absolutely exposed to foreign competition. I will say nothing about the loss of the profits of the carrying trade, for it is quite possible that it is no real loss in that sense; for those who would carry on that business are now busy at something else, and it may be are making as much for themselves and contributing just as largely to the national wealth as if they were sailing ships. But there is a real and serious loss of national reputation and prestige in the disappearance of our flag from the ocean. Moreover, two dangers threaten, should a great war arise in which England was engaged, (1) her merchant marine might be drawn into her navy to such an extent as to make it difficult to send our products abroad, (2) English merchant ships would be subject to great dangers from hostile cruisers. So of any other large carrying nation, and we should be powerless to defend our greatest interests. Again, a strong merchant marine is needed as a safeguard in case the United States should become involved in war, both as furnishing an immediate supply of ships, and as forming a training school from which to draw naval recruits. To cure the disease that has attacked our shipping we have tried almost everything but letting the industry care for itself; it might be worth while to try that.

FOREIGN RIVALS.

Let us now consider briefly the competition we have to meet in foreign markets. As to cotton, it has already been said that our position is not easily assailed; we have so great a lead that we shall hold our own. While the yield of our plantations has vastly increased in recent years, there has been no great gain, or there has even been a decline of production in other cotton producing countries. In wheat we shall continue to show that intelligence, skill, improved implements, scientific methods, and the best transportation facilities are infallible against rivals who lack these advantages, though they be nearer to the market, have equally fertile soil, and pay much smaller wages. We are annually sending out over \$3,000,000 worth of approved agricultural implements. We can afford to do that much for benighted foreigners. Our chief rivals in cereals are Russia, India, and the English colonies, but there is no present cause for alarm. In the great and

fast growing business of supplying fresh and packed meats, our cheap ranges, inventive skill, and facilities for transportation constitute a trustworthy safeguard. It is true that this trade seems to be meeting a check at the present moment, but this will hardly be permanent, unless we continue too long our senseless policy of commercial restriction. But so long as we put barriers in the way of a free interchange of commodities, and think we can grow rich by taxing ourselves to fill an overflowing treasury, there will exist a constant menace of retaliation or a resort to freer markets on the part of those to whom we wish to sell.

Here arises a question as to the spirit in which our increasing agricultural exports are regarded abroad. It is a question that demands careful consideration in this country.

FOREIGN CUSTOMERS.

The largest purchaser by far of the exports under consideration, is England. During the year ended June 30, 1882, of our total exports of commodities amounting to \$733,000,000, \$469,000,000, or sixty-four per cent. was taken by England; and of the agricultural exports in that year, she took not far from seventy per cent. Manifestly the attitude of England toward this state of things is of the highest importance to us. The course of trade between this country and England is narrowly watched there. Especially in recent years have land owners and farmers felt the sharp competition from this side of the Atlantic. English agriculture is undergoing great changes, and the land question is becoming more and more prominent; though just at the present moment, perhaps, more attention is devoted to the proposed radical changes in the conditions of the elective franchise, and the basis of representation in the House of Commons. It is well known that for several years that country has suffered "bad seasons," rents have been tumbling, land is a drug in the market, farmers have given up their farms, and those who have been accustomed to live in luxury upon their rents, have become straitened in circumstances. In former days the corn laws enabled the farmers to get high prices for short crops, but that sort of legislation ceased forty years ago. And yet, since free trade in grain was established, English prices have been, upon the whole, higher than before. That was due to the great stimulation of manufactures that resulted from the overthrow of the protective system in England, and the consequent increase in the scale of wages—an increase that more than made up for the higher price of food, and which lessened the price of manufactures by increasing the efficiency of labor. But within a few years American competition in breadstuffs has become more effective, largely through the reduced cost of transportation, which has been described. The succession of bad seasons has made things worse, and so it is not strange that there should have been talk of somehow trying to change the state of affairs. The fact that our sales to England far exceed her sales of manufactures to us, led to some talk of trying to force us to lower our tariff on manufactures by retaliating duties upon our breadstuffs, and the purchase of supplies more largely from her colonies. This was the Fair Trade idea so much talked of two years ago. We might be greatly injured by such a policy, but the difficulty is that England would certainly have to pay more for her food supply, and so might harm herself quite as much as us.

At any rate, Fair Trade is not a live issue in British politics to-day, and a return to the protection policy seems as far off as ever. The remedy for the distresses of agriculture will be found in other quarters. In Ireland a beginning

has been made of a radical change in land legislation—it will spread in some form to England, leading, probably, to smaller holdings in fee, the abolition of entails and settlements, and, perhaps, to the doing away with the custom of primogeniture. On the other hand, English farming capital will continue to be directed away from the culture of wheat and into channels where, in the nature of things, foreign competition cannot be so effective. It is estimated by Mr. Fawcett that England imports more than half of her wheat supply, and more than one-fifth of her fresh meat. These proportions will increase. Our own contribution to her total foreign food supply, even including those articles in which we do not compete with other sellers, is not far from one-half.

While there has been little difference of opinion among Englishmen as to the great advantage of cheap supplies of food, the two next largest consumers of our products, France and Germany, in the action of the governments of the two countries, have put barriers in the way of importation. I refer to the charge of unhealthfulness brought against American pork products, and the attempt to restrict or prohibit trade in them. For many months all merchandise of this description was shut out from France, and while there has been recently some relaxation in this matter, the regulations at French ports regarding inspection are so vexatious and so harshly applied as to amount, in a large measure, to a virtual prohibition. The German government, by duties and absurd classification, sought the same end. American hams, in their familiar yellow muslin coverings, were subjected to high duties as cotton manufactures, and in a similar spirit canned goods have been taxed as tinware. Finally, the importation of American meats was absolutely prohibited, and a recent consular report to the Secretary of State says that by order of that government it is even forbidden to ship these goods through German territory, though consigned to foreign dealers. The same report states that England, Holland, Norway, Sweden, and Switzerland were, at the time of writing, the only European countries open to American meats.

The alleged ground of this action on the part of foreign governments, the unwholesomeness of American meats, has been abundantly shown not to exist in fact, and it is not likely that those who made the charge ever believed in it. It was simply a convenient pretext. What was the real object in view? Simply this, to relieve their domestic producers from the pressure of competition, and so to sustain prices. Americans can have no difficulty in appreciating the situation. The same purpose underlies our tariff legislation, only instead of pretending that foreign manufactures are dangerous to health, we pretend that we can make wages high and goods cheap by heaping taxes upon production. The French and German governments have effected their real purpose. Food has been dearer. The landed aristocracy have sought to preserve their incomes from rents at the expense of the mass of consumers, who in consequence have found it harder to supply their tables with wholesome meats. When the facts become generally known throughout Germany an enormous pressure will be brought to bear upon the government to rescind this legislation. But if this is done, it will seriously mar the symmetry of the protective system that Bismarck is trying to foist upon Germany, and may lead to a more reasonable national policy.

“It was asserted last year,” says the New York Tribune, “that certain French provision dealers had brought pressure to bear upon their government to secure the exclusion of American pork products.” It is now said that French “statistics show that the prohibition of the importation of pork from

America seriously curtails the food supply of France, and there is no other source wherefrom the demand can be supplied."

It is not possible, however, to shut out these products entirely; and probably a part of the recent increased exportation of pork products from this country to England is to be accounted for by the alleged practice of reshipping American goods to other European countries as English products.

A word may be said regarding a suggested method of retaliating upon France. A member of congress the other day urged that the way to bring France to her senses is to inspect her wines entered at our custom houses and rigidly exclude adulterated articles. This action, if we may believe all that is alleged, would surely bar out a great deal that passes for wine. And it is a curious fact that there has been no notable falling off in the importation of French wines so-called, in spite of the deadly ravages of the phylloxera in those vineyards. Adulteration is very probably practiced. But suppose we do this and France removes her unreasonable restrictions, shall we then give up our inspection and begin again to drink poisonous compounds without asking any questions? That would be an entertaining spectacle; but it is the logical outcome of the proposed measure. If we are after retaliation, the adulteration of French wines is the last thing we want to ascertain. We had better shut out all French wines for a time, so that we can meet French concessions without making fools of ourselves. By this course, unless that country quickly came to terms, we should bring about an incidental result of considerable importance—that is, a great stimulation of wine production in this country; and moreover, a vast quantity of domestic wine that is now dressed up in French labels would appear in its true character.

In all probability, no scheme of retaliation will be tried, and the trouble will disappear in time through the operation of natural and irresistible forces. What we want is likely to come about quite as soon in this way. Meantime, it is to be remembered that these countries really afford a market for a comparatively small part of our surplus food products.

Since the foregoing was written a very active discussion has been kept up in Congress and in the public press, and it seems to me that the continued discussion is leading to counsels of moderate action. It is at any rate unwise to take measures of retaliation before giving foreign governments official assurances of the facts ascertained by correct scientific methods. Official inspection of meats at ports of exportation would seem to be one thing that should be secured. Congress has called for the correspondence of the department of state with foreign governments concerning this matter. These papers will no doubt throw much light upon the subject. Recent advices from abroad indicate that public opinion in France and Germany is making itself heard in this matter. They are discussing a revision of the national constitution in the French parliament, but the newspapers are loudly declaring that cheap meats are of more importance. The cry is for bacon before amendments. In Germany the learned Professor Virchow declares that the alleged ground of the action of the government is "all moonshine."

THE BALANCE OF TRADE.

It is rare that one hears any discussion of foreign trade without hearing something about the so-called balance of trade. In recent years our exports have been largely in excess of our imports, and the surplus products of our farms have made this condition of trade possible. Shall we consider it a fortunate or an unfortunate state of things? This is a question upon which

it is strangely easy to get confused ideas, and it may not be unprofitable to speak upon it briefly in the few minutes that remain. A common notion is that what is called an adverse balance of trade, i. e., an excess of imports over exports, is an undoubted national misfortune, whereas what is called a favorable balance of trade, i. e., an excess of exports over imports, is looked upon as cause for great rejoicing. In the former case, we are told, the nation is buying more than it is selling; in the latter it is selling more than it is buying. In one case it must be ruining itself like any spendthrift; in the other, like our thrifty neighbor, fast getting rich. To quote a popular writer, "A family earns its own expenses, or more, or decays. A nation sells as much as it buys or decays. This is 'the balance of trade.'" When any one can show how a family can earn \$900 and pay out \$1,000 yearly, and still prosper, we may see how a nation can export \$90,000,000 and import \$100,000,000 yearly, and not grow poor." The same idea underlies the following extract from an article in the *International Review* upon the American export trade:*

"The most interesting and encouraging event that has occurred in our commercial history for many years is the rapid increase of our exports during the last few years, and their unprecedented excess over our imports since 1875; reversing the balance which our foreign trade has recorded against us for more than four score years. Year after year, and decade after decade, with nearly the regularity of the seasons, or the rise and fall of the tides, the excess of imports over exports has kept steadily on for over eighty-four years, drawing out a long and formidable balance of our international account against us; until at the close of 1875 this adverse balance of mercantile debt had run up to the surprising amount of \$1,726,637,547." The changed state of trade has continued, so that at the close of the last fiscal year the excess of exports for the previous eight years amounted to \$1,307,253,941. This latter is indeed a remarkable showing of the results of industrial enterprise in this country in furnishing a surplus for the settlement of foreign obligations. The fact is that we have in former years been securing enormous advances from foreign capitalists for carrying on enterprises of various kinds, and not the least among these a very costly civil war. We should find upon an examination of international exchanges in recent years, that this favorable balance of trade has come about because we have been "taking up our paper," in other words, paying off United States bonds held abroad. It is true that during the war we spent more than we earned; we were borrowing and paying with promises to pay. So, too, before the war, the prevailing balance against us was to be accounted for in part, but only in part, by the fact that foreigners were making investments in this country; and such transfers of capital are regularly effected through means of bills drawn against commodities exported to this country. Some portion, also of this balance was the effect of the constant stream of immigration pouring into this country. Every ship brought capital of foreigners coming to make their homes here.

A part of the balance also was settled by the surplus product of our gold mines beyond what was required for money and in the arts. But taking away the effect of these causes, there would have still remained an adverse balance of trade, which represented neither capital borrowed nor capital brought to this country by immigration, but the natural profits of a prosperous foreign trade. Strange as it may seem, every nation is prosperous in the long run as it has an "adverse" balance of trade. Every cargo from New

* Vol. 6, page 59.

York to Liverpool must sell for enough to pay for the carriage, and a business profit over the cost in New York; and the return cargo which really transfers the value must sell in New York at a similar advance. Adverse balances in general, then, represent the profits of successful commerce. But we have recently enjoyed the so-called "favorable" balance. Are we, then, carrying on a losing trade? By no means; our exchanges are in this condition to a large extent in consequence of the happy fact that we are rapidly paying off our debts. In certain other respects our condition is peculiar. The whole matter may be stated in brief terms.

We are to-day meeting various obligations to foreigners by means of our exports,—(1) as always, we pay in that manner for imports; and (2) we are meeting the interest on the investments of various sorts that foreigners have with us; (3) we have been paying off the principal of some loans, as notably in the case of national bonds sent back for redemption; (4) it is estimated that \$100,000,000 per annum is the cost of carrying commodities to and from the United States, and as that business is mostly in the hands of foreigners, we must pay our share of this charge by increased exports. So, then, our present commanding excess of exports is in part a sign of a national disadvantage. The figures given would be modified considerably if we take into account the exports of precious metals of which this country has for many years had a surplus. The general principle of international balances will bear repeating: "Exports are what we pay to foreigners. Imports are what foreigners pay to us. If our imports were not worth more to us than our exports we should be doing a losing business."

The statistics of English commerce are instructive upon this point. In the last ten years the value of the imports received by England exceeded the value of her exports by nearly \$5,000,000,000; and at the same time she imported 75 millions more of gold and silver than she exported. This enormous "adverse" balance is the sign and proof of England's boundless wealth. What are the items included in the vast excess? They are (1) the profits of successful trade; (2) the earnings of her ships; (3) interest upon her investments abroad; (4) the discounts of her bankers in settling the transactions of the whole world.

CONCLUSION.

It is evident that trade between nations as between individuals, is founded upon mutual advantage. The American farmer has found a large market abroad and must continue to do so, or else largely restrict his production. And the foreign buyer must make his payment by means of commodities sold to this country. Thus the larger our exports of surplus products, the greater the American demand for foreign commodities; and the larger the sales of those commodities in our markets, the greater the demand for our surplus, whether of farm products or of manufactures. Our exports of manufactured products now amount to from one-eighth to one-sixth of all values exported; agriculture, the mines, and fisheries make up the rest. What is more, agriculture bids fair, with the opening of new land and the expanding live stock business, to add to the three-fourths of our exports which it now supplies. On the other hand, our manufacturing establishments are reducing wages or entirely shutting down, and there is a widespread cry of depression. The available market will not take all our mills can make; the capacity of our iron mills far out-runs the present demand; our cotton mills can fill the domestic market by running less than nine months out of the twelve on full time; a similar con-

dition exists in the shoe trade and many others. What they need above all is an outlet to foreign markets; yet they are making no considerable gains in that direction. By an elaborate system, or no system, of tariff taxation, the cost of production in the United States so far exceeds that of other competing nations that we can find no outside market for most of our surplus manufactures. Furthermore, we have so discouraged foreign trade that the commercial relations essential to the desired trade do not exist, and they cannot at once be supplied. And in addition there is needed a large and progressive American shipping interest. With a prosperous commercial marine, free raw materials and machinery, our manufacturers could enter the markets of the two Americas and the whole world. In consequence the real wages of labor would be largely increased, and more and more the bulky products of the farms would be consumed on American soil. The dream of the advocates of the "American system" would approach realization in a growing home market for the farmer. As a nation we should be employing skill and labor in the most effective ways, and in consequence be most rapidly and surely building up national wealth and greatness.

RELATIONS OF RAILROADS TO FARMERS.

BY W. O. HUGHART.

[Delivered at Grand Rapids Institute.]

The following is an abstract of his address: The ground has all been fought over politically and all interests are satisfied with few exceptions. The commercial and traveling public are more than satisfied. The manufacturing interests are satisfied because of the increased facilities for bringing raw materials to market. All are in harmony except the agricultural and granger interests. The present railroad mileage of the United States is 120,000 miles, the value of which is seven billions, nearly all representing solid value in material and labor, comparatively little in "franchise" or land. The value of the farms is twelve billion, including buildings, fences, implements, and all farm stock, but not all representing labor or material; much of it is in the soil. What would be the value of all this farming lands without railroads? Perhaps nothing, the land being valued exactly in proportion to the accessibility to the market for surplus products. Highways are practically worthless in modern days in reaching a competitive market. The Agriculturist for February says, we have four and one-half million of farm teams or spans of draft cattle. To transport the freight now hauled by railroad, these would each have to pull one ton twenty miles per day for 300 days in the year and receive therefor at the average railroad charges, thirty-four cents per day for man, team, and wagon, and out of this pay board, feed, repairs, wages, interest and wear and tear, allowing nothing for expenses of return trips. Think of hauling one ton twenty-five miles for twenty-five cents, including team, driver, wagon, boarding, loading, and unloading. This you would be compelled to do to compete with farms possessing railroad facilities.

In the light of business and in the strength of comparisons, both farm produce and farms themselves would be without value. A railroad may be regarded as a person having well defined rights and duties and entitled to the

same protection as any other person, but it never gets it. A railroad before construction is always desired, helped, and welcomed, afterward persecuted. There is not a legislature that meets which does not try to encroach on the charter of the railroads. The railroads take from the farmers the land for the road, whether they are willing or not, and what do the farmers get in return? They are paid and paid well. They receive a permanent fence on their farms, on both sides of the track, and are protected even against their own carelessness. If a farmer leaves his fence down, and if in a consistent length of time it is not repaired by the railroad company and any stock is killed thereby, the railroad company is liable. No matter what the cause or who is the author of the breach. Trains must be run and baggage checked, but fare for travel is rigidly controlled and excessive charge for freights carefully guarded against. It seems sometimes as if a railroad is a crime and ought to be suppressed. There can be no railroad monopoly in this State, for railroads may be paralleled, the right to use tracks and buildings may be forcibly taken by any other road, and lines may be crossed by any highway, and every farmer is entitled to a crossing. They have a monopoly of kicks and curses, and no one wishes to take that from them. All farm products over home necessities find a market at home or abroad. A number of years ago a farmer was obliged to haul his corn to market or distill it and market it in a concentrated form. Then the railroads acted as reformers. When a railroad came through the distilleries were destroyed and the product taken to market as it grew, and caused a potent reform in the community. Over ordinary highways, the cost of transporting wheat is about 20 cents per ton, which gives a farmer a market radius of about 185 miles before it exhausts itself by expense in carriage. By railroad the rate of one cent per ton per mile is to be obtained anywhere, which gives a radius of 37,000 miles to the farmer for a market. The chief benefit is that the market is brought to the farmer's own door; he does not have to laboriously transport the produce to a village to find a customer. Practically, the farmer has the market of the world at his door. This is what has made this country great. The rates on railroads have been so reduced that they have to do two and a half times as much work now to earn a dollar as they did twelve years ago. Wheat can be transported from Grand Rapids to London cheaper than it can be from Liverpool to London; that is, American railroads can carry a ton of wheat 900 miles by land and 3,000 miles by water for less than English railroads carry a ton 200 miles.

What is discrimination? It is generally declared to be a charge of a greater rate per ton for one distance than for another. But this is inevitable if the railroads would give the distant farmer access to market. It is the near man to market who complains. A man 50 miles from New York pays 10 cents per bushel to New York, and Michigan farmers only pay 16 cents per bushel to the same place. If the charges were in ratio to the number of miles Michigan would pay 60 cents per bushel. This would entirely shut out the great wheat fields of the northwest as well as Michigan. The farmers give the railroads but little revenue. A purely agricultural community never supported a road. The surplus of grain in Michigan for 1883 is estimated at 360,000 bushels. If I owned all the roads I would contract to take the entire surplus out of the State in one day. In 1883 only seven per cent of the entire tonnage carried by the G. R. & I. was farm products, but it is growing, and when the mammoth pineries are gone the business and farming interests will make a fairly paying railroad. I call the traveling public "The Great American Baby." It

has a guardian appointed—called a commissioner, a committee also. The commissioner must see to bridges, tracks, cars, etc., and direct the rate of speed if he thinks there is danger. He may stop the running of trains absolutely. The railroads must have a flagman at street crossings to keep people from putting themselves under the trains, and now must put up gates, as a watchman can't hold the baby. Must check baggage. Must call names of stations. Must whistle or ring bell at road crossings. Must have air brakes. Must not employ men that drink. Must not put him off when refusing to pay fare, except at a station or dwelling house. Must protect him against swindlers on cars. Must put up boards at road crossings, advising the passing traveler, that a railroad is in the neighborhood, and give minute directions to have the letters large enough. Must fence the farms, even when we pay full value for the lands, not half fence, but all of it. Must have badges on train men. The kind of oil for lights is specified. If a passenger loses his baggage he is allowed to testify in his own behalf, and his testimony is by law declared to be receivable as if he was not interested. The railroads must cut weeds. Must have an ax and a saw in every coach, and lifting jacks. Every session of the Legislature has something new. The average railroad bill is an attempt at confiscation. It is dangerous to confiscate property. It is only a form of socialism, and in time will act upon farm products. The price was once fixed in Rome on bread and wheat, and it may be again, and I think some here to-night will see it. Socialism is a dangerous thing.

HOW WE FARMERS ARE SOLVING THE GREAT TRANSPORTATION QUESTION.

BY E. A. BURLINGAME.

[Read at Grand Rapids Institute.]

In all first-class agricultural periodicals, and in many not purely agricultural, the services of persons learned in the law are employed to discuss for the benefit of the farmers, their legal rights and liabilities. So, in all the more respectable farm clubs, associations, and alliances, the services of some eminent attorney is secured to present the law in all its bearings as it relates to agriculture, as well as to interpret its intricate technicalities, to the end that both the press and the association shall confer upon the farmer the greatest possible good at the least possible expense. As an instance I mention the West Michigan Farmers' Club, whose office is adjacent to this hall. Their doors are open to all, whether directly or remotely interested in agriculture. And all the benefits of that club are conferred without money and without price.

To discourse upon the law appertaining to the farm, the farmer, and the farmer's wife, that club has secured the services of Judge Parrish, of this city, than whom there is not a more clear, concise, and learned lawyer, or a more prompt, practical, and profound judge upon the bench of Michigan. Besides these advantages that club publishes an official organ, *The Agricultural World*, in which all the varied and interesting farm news, club discussions and lectures upon the law are published, and furnished to farmers at 35 cents per year. With such special advantages in his favor, besides the general

advantages of club and grange libraries, together with the literary, scientific, and political periodicals of the day, easily accessible to him, tell us who will, why the farmer should not be one of the most learned, astute, and sensible persons in the world; and yet while we see men of every other conceivable labor, trade, avocation, and profession harmoniously at work, each in his own direction, seemingly willing to live and let live, each battling for the common good, striking with the keen ax of unanimity and intelligence at the root of all obnoxious legislation, we find the farmer climbing up a rickety ladder, with a dull hatchet of questionable policy, trying to see how small a twig of our industrial "Upas" he can bruise off in the longest conceivable time, seemingly studiously avoiding all great and momentous questions that should require prompt and emphatic legislation, and busying himself with insignificant and unimportant matters, unmindful of a ponderous national debt, and its constantly accumulating interest; forgetful of extravagant appropriations for rapidly increasing and profligate public expenses; taking no thought of the enormous grants of land to pretended corporations who seek to gain title to the same without an apology for a consideration; ready for the pittance of a few cents tariff on a single industry, to grant the right to moneyed monopolists, to reach their fingers to the bottoms of the pockets of our poor industrial people, and to make a free grab bag of their meagre purses to fill the coffers of the rich. In not one of these great issues have we, as farmers, ever suggested a candid, practical solution, or made a united and pronounced attempt at reformatory legislation. It is true that while wolves have been devastating our flocks we may have been strenuously searching for skippers in our cheese.

Now to illustrate exactly what I mean, I will take the important question of railroad transportation; for on that question all of us farmers pretend to be posted. Now what have we done toward solving that question? Absolutely nothing but petition and whine. We have never made it an issue upon which we have either attempted to nominate or elect a representative to our legislature. All we look for in that direction is did my party nominate the man, and if so, that is sufficient. Questions of monopolies, transportation tariffs, land grants, government expenditure and what our babies are to have for supper all sink into insignificance before the fact that he is the nominee of my party. For this reason we have done absolutely nothing. We do not even meet the railroad companies half way in our endeavors to secure more favorable rates of transportation by massing our products in such quantities as will make it to their interest to give us rates, but instead we send, as it were, a peck of potatoes in a paper sack for shipment and whine if these "great monopolies" do not give us rates. I said before that we had done absolutely nothing in regard to the transportation question. But there is one phase of it which we have pushed with an energy worthy of the cause. But whether our action has been in favor of ourselves or the railroad companies is, to my mind, still an open question. I refer to our united and glorious action in reference to legislative passes. On that issue of passes, we elected in this county two editors and defeated two farmers. In that issue we made it our special duty to see that no railroad company squandered its money on representative farmers, or in other words, to see that our representative farmers pay full fare to all railroad companies over whose lines he is to be transported. One representative paper of us farmers grows eloquent over the abolition of representative passes, and at the same time begs transportation for himself over the same roads. Our State Grange passes resolutions against the free pass system, while the same members will crawl in the dirt to get half fare to and from its ses-

sions. Thus we "strain at a gnat and swallow a camel." Now, my idea of railroad passes is this; if a railroad company can stand it to give two-thirds, or one-half, or the whole transportation to our farmers or their produce from one point to another, I am willing they should.

We seem to be the most consummately absurd people that exist. We talk vehemently, discuss and resolve, and abuse railroad companies if they will not transport our produce for half price, and curse ourselves and them if they transport us for nothing. We beat them down to the lowest figure for transporting us to State Granges, State picnics, State conventions, and State fairs, but the moment they take us for nothing then we whine and talk of bribery. If we find fault with them for transporting our carcasses for nothing, may they not presume we would whine if they transported our crops for nothing. Tell me then, who can, what the poor, confused, disheartened railroads can do? They charge too much if they charge anything, and too little if they charge nothing. I repeat the interrogatory, what can they do to satisfy us? Or what respect can they have for such puerile dissatisfaction? How is it that a free pass can bribe your chosen representatives to the State Legislature, while the half-fare tickets cannot warp the petitions or resolutions of the delegates to the State Grange? How is it that the free pass poisons the enactment and not the editorial? We pause for a reply.

THE AGRICULTURAL COLLEGE.

BY SECRETARY R. G. BAIRD.

[Read at Berrien and Caro Institutes.]

My subject may be presumed to be one of interest, especially to the farmers of the State. Were the work of the college more generally and thoroughly understood, other classes of our citizens would be almost equally interested in it and the advantages it affords, comparatively speaking, almost "without money and without price" to the young men who are seeking an education that will increase their capabilities of usefulness, would be sought after by a very large number of that class.

After debating in my own mind which would be the better way, viz., to prepare a formal address on the college, or to spend the time given to its consideration by a general discussion in which I would endeavor to answer the questions on which information was asked, I concluded that a compromise between these two methods might be better than either, and more in accordance with the way in which topics are treated at these institutes, *i. e.*, to have an address followed by discussion.

After listening to me, you can all have an opportunity to talk back, and the points discussed need not be confined to those which are presented in this address. We are here to receive suggestions as well as to give them. As citizens of Michigan we are all interested in the college, and desire for it the greatest efficiency and the largest possible usefulness.

It is not my purpose to discuss all the objections that have been urged against the Agricultural College. No doubt, generally speaking, these objections have been honestly and, some of them intelligently made; and, if the

institution has not been improved through criticism, it certainly has had ample opportunity, for it has surely had its full share.

Some of these objections however are made so frequently and in so public a manner that it may be well to refer to them before considering in a more specific manner the work of the college.

I should not be surprised if some of you may have heard it objected to the Agricultural College that it is too expensive. There are certain newspapers in the State that during every session of the Legislature feel called upon to reiterate the assertion that the Agricultural College costs the State more, in proportion to the number of students attending it, than any similar institution.

I do not wish to controvert newspaper statements, for in the first place it is apt to be a very one-sided controversy, and in the next place I think newspapers generally try to represent things as they believe them to exist, and in the third place, public institutions are proper subjects of criticism by our newspaper press. However, when it is said that the Agricultural College is more expensive to the State as per student than other similar institutions, the assertion is one which it is very difficult either to prove or to disprove. One reason of this is that we have no *similar* institution in the State. The Normal School course, being almost entirely literary, is very different from ours, while its direct relation to the profession of teaching in the common and graded schools of the State, secures for it a large number of students of both sexes. Then the University, when the cost of its students to the State is given, does not give merely those in the literary and scientific courses, but the whole number of its students including those in the study of law, medicine, dentistry, and pharmacy. These last named courses include a large proportion of the students at the University, and involve no expense to the State, while some of them it is claimed are a source of revenue.

On the other hand, the course of instruction at the Agricultural College is a strictly scientific course, which, in the very nature of things is, and always will be, expensive, as compared with a literary or classical course. Instruction in the natural sciences, as now given, involves a large expenditure for cabinets, museums, books of reference, apparatus, etc. Those who have had the management of the college, believing that what it is proper to do at all, should be done well, have asked of the Legislature, from time to time, for what they believed to be necessary in order that the institution might be properly equipped for its work in the way of buildings, apparatus, specimens, etc., and the Legislature has generously, and in every instance, made the appropriations asked for, and the result is that to-day we have in the Agricultural College of Michigan, an institution as thoroughly equipped in the line of its work, as any institution of the land; and I assure you that if your sons go there and graduate from that college, having made the best use of their time while there, they will have obtained an education that cannot be surpassed in real worth for the same outlay of time and money, by attending any other college in this or any other country.

So much for the individual student; but now let me give some facts and figures with reference to the cost of this work to the State, and let me preface this statement by saying that I have taken as the basis of it the year which makes the worst possible showing for the college, viz.: the fiscal year closing with the 30th of September, 1883, as during that year there was a decrease in the number of students as compared with previous years, while two distinct departments, viz., Horticulture and Veterinary, were organized, necessitating the employment of two additional professors.

During the year ending September 30, 1883, the college received, through the State Treasurer, on account of current expenses, \$30,331.63. Dividing this amount by 182, the number of students for that year, it would give as the cost per student, about 166 dollars.

It should be borne in mind, however, that the college is using a good deal of this money in other work besides that of teaching. There are four distinct departments that are doing experimental work; there is the care of grounds; meteorological observations, and work connected with Farmers' Institutes. There are various analyses and investigations made in the interests of agriculture and horticulture, relating to soils, plants, insects, etc.

It would be fair to allow that nearly one third of the thirty thousand dollars is expended in work outside of teaching students, which would leave us the cost per student \$110.66. This amount per student would give as the whole cost for teaching the past year \$20,140.12.

The receipts on account of interest from the congressional land grant fund for the same years amount to \$22,139.13, or nearly two thousand (\$1,999.01) dollars in excess of the cost of teaching.

The actual work of teaching, therefore, at the Agricultural College is paid by the interest accruing from the sale of lands that were a gift from the U. S. government for the support of an institution giving instruction relating to agriculture and the mechanic arts.

The question, therefore, "What does it cost the State to educate a student at the Agricultural College?" properly answered would be, "It costs the State nothing." That expense, every dollar of it, is now paid by the interest accruing from the sale of lands that were a gift from the U. S. government, and have cost the State nothing more than the expenses incidental to the locating, appraising, and selling the land.

The college is, or ought to be, returning to the State, through its experiments, its published reports, its farmers' institutes, its meteorological work, its analyses of soils, grains, grasses, and other foods, and its influence, directly and indirectly, on immigration, full value for all the money that it asks from the State, except for buildings. As the interest from the sale of lands cannot be used for buildings they must be erected and maintained at the expense of the State. Now, in view of the facts which I have stated, it would certainly seem that of all the educational institutions of the State the Agricultural College is the very last that the people will be likely to feel as being financially a burden. It asks nothing of the State but what it will expend in work directly in the interest of its greatest industry; not only with regard to the capital invested and the number of persons employed, but also as regards the prosperity of all the other industries depending upon it. If the State no longer needs that work, or thinks it unprofitable, it can withhold the appropriations for it, and the College will still go on with the proceeds of the money which the State holds in trust for its use, educating the students that you send to it. But the State of Michigan does not believe in a progress that goes backward. It is not asking the College to-day to narrow its sphere of operation, but rather to widen it; not to do less but more and better work for the promotion of agriculture; and the Board of Management, consisting of practical, wide awake men, most of them farmers, are looking forward, not backward, and have under consideration lines of work that may give the College a larger usefulness in that direction, and keep it in the most intimate relations with the farmers of the State.

Again, it is sometimes objected that very few of the boys who go from the farm to the college return again to the farm.

I think this is not the case to any such extent as is generally supposed, and perhaps if we were to give the matter the attention which it deserves we might find that for the extent to which it is true the college is not to be blamed so much as the influence by which the boys were surrounded before they came to the college.

The alumni of the college have an organization which not only meets triennially, but also collects and publishes from time to time certain statistics from which we learn, among other things, the occupation of the graduates. The last published statistics show that a little over one-half of the graduates are actually engaged in farming.

Now, when the students first enter the college, they are required to fill out a paper, which is filed in the secretary's office, to be entered on the college record. One of the things they state on this paper is the occupation that they intend to engage in after leaving college. My assistant has made an examination of this record, and of the boys that have come to the Agricultural College during the last four years, 38 per cent intend to be farmers after they leave it. I have known personally of quite a number of young men who came from the farm to the college, never intending to return to the farm, but who had a love for the occupation first awakened in them at the college by the discovery that it was an occupation furnishing ample scope for the best trained minds, and one in which intelligent and well-directed labor was as likely to be liberally rewarded as in most other occupations. The difficulty about keeping the boys on the farm is largely a thing of the past, and had its origin in the humdrum methods and general lack of progress, that regarded improvements as innovations and hard unintellectual work as the only thing that could succeed, and made intellectual growth an impossibility, and sneered at "education" as something quite unnecessary if not a positive hindrance to a farmer.

How speedily all this has been changing during the lifetime of the present generation. What a wave of intellectual quickening has rolled in upon the entire agricultural community until to-day the sun shines on no more intelligent class of workers than the farmers of America. They have begun to realize that agriculture has its best rewards not for physical force but for science and good sense. And in these days of competition of the smaller and older farms of the eastern and middle States with the great fertile valley of the Mississippi and the extensive plains west of the Rocky Mountains, ignorance and brute force will be left behind, and science and sense shall win the prize.

When I look at the harvester of the present, doing its work so grandly and so speedily, cutting and binding as if by magic, and compare it with the harvest field of my boyhood, where we bent all day over a sickle, gathering the grain by handfuls among stumps and stones, I cannot help regretting that I had not been born a generation later, and if I had I do not believe there would have been any difficulty about keeping me on the farm.

I think it an exceedingly silly objection to the Agricultural College that we find a goodly number of its graduates in other occupations besides that of farming. If the college only gave such a meagre special education as in the opinion of some is best suited to the wants of the young farmer or mechanic, and failing to discern and meet the necessity and propriety of an advanced education for those engaged in such pursuits, assigning its students to inferior

places and excluding them from those high positions where broader educational attainments are indispensable, then I can see no good reason for its existence. I think it is to the honor of Michigan Agricultural College that we find among its graduates men who are in high positions as scientists, educators, and journalists. I do not attach a very high degree of importance to the percentage of our graduates that go back to the farm, and I think the time is not far distant when but few will care to ask how many of our graduates are farmers, but it is of vast importance that the college should do the best possible work in fitting the young men of the industrial classes who attend it, by giving them a liberal and practical education, such as shall fit them for the "several pursuits and professions of life." Not how many farmers does your college turn out, but how many useful, practical, efficient men. This is what the college aims to do. For a long period the idea of an education was entirely separated from the work and business of life. It was something for the few, and, instead of being meant to make these few more helpful to the many in the way of making the burdens they had to bear fewer or lighter, it was rather to separate them from the common herd and elevate them to a position where they looked down with stoical indifference upon the toiling millions, without either the disposition or the ability to help them. So long as this was the dominant idea of an education there was but little taught except philosophy, so called, and that philosophy was very largely the fine spun theories of blundering egotists. Then the study of the dead languages came to constitute an important part of an education. This is a study which unquestionably has a refining influence upon the mind which pursues it. It enlarges the range of knowledge, although, after all, an intelligent reader will get more mental pabulum from reading the works of Shakespeare than can be gleaned from all the ancient classics.

The result of the old idea of an education was to make pedants and egotists who would regard it as degrading to soil their hands with anything relating to the world work, so they went through the world with their feet in its puddles and their head in the clouds. It never entered the minds of these so-called scholars that education was to benefit the race, and so the world went on century after century, almost absolutely without progress. Generations came and went, each leaving the world as they found it. At length a few men of genius discovered for themselves, and revealed to the world that there were other books besides the disquisitions of philosophers. They began to unfold the great book of nature that God had been writing all along the ages for men to read, and which they had too long neglected. Then men began to learn as they had never learned before. It was the bursting forth of a new era of light and glory, which brought in its train the unnumbered discoveries and inventions that go to constitute the civilization of this nineteenth century. The old education made a few dreamers, and left the masses helplessly toiling on in darkness and degradation. The philosophy and languages of the schools brought no progress and but little elevation to the race, but the new education gave mankind the steam engine, the locomotive, the railroad, the telegraph and the thousand improved methods of doing the varied work of life. In short, it has given to man that dominion over the material world which Heaven designed he should have, and which could only come to him through the study of the natural sciences, in which he is taught concerning inorganic matter, and the laws of organic life.

While not regardless of those studies which are essential to the training of the powers of the individual mind, such as mathematics, through algebra, geometry, and trigonometry, also the art of "speaking and writing the Eng-

lish language," by means of rhetorical exercises, and the study of text books on English composition, also logic and moral and mental philosophy, the course at the Agricultural College is largely made up of scientific studies and the application of scientific and mathematical knowledge, with special reference to agriculture, horticulture, surveying, and mechanical construction.

In chemistry we have elementary, in which students are taught regarding the nature and uses of the simple or inorganic substances, followed by lectures in organic chemistry, the compounds of elementary substances that constitute organisms. Then the student goes into the laboratory, where he analyses a great variety of substances, "under the direction and supervision of the Prof. of chemistry and his assistant, applying with their own hands the reagents required to determine the composition and properties of bodies, thus securing a practical knowledge of the methods employed in such investigations." The Professor of chemistry also gives instruction in agricultural chemistry, meteorology, and chemical physics.

In botany the student is introduced to the study by using his powers of observation on plants, noting the forms of leaves and characteristics of stems and roots, arrangement of parts, peculiarities of flowers, seeds, and fruits. From their class books they study systems of classification, geographical distribution, the agency of insects in the fertilization of plants, etc.

In physiological botany the students have practice in the use of the compound microscope, and receive lectures on the structure and use of the microscope and the anatomy and physiology of plants.

In the course in anatomy and physiology, the teaching is illustrated by models, anatomical preparations, and diagrams, and special attention is given to the physiology of domestic animals, and each student is required to spend some time in the dissecting room.

In entomology the student is taught regarding the various transformations in the development of insect life. Special attention is given to species injurious to vegetation; their habits, and the methods of checking their ravages. Instruction is also given in the science and practice of bee keeping.

In geology a course of lectures is given, illustrated with maps and drawings. Special attention is given to the geology of our own State.

Two terms of instruction are given in practical agriculture; relating to farm drainage, breeds of cattle—their characteristics and uses, principles of stock breeding, rotation of crops, and many other topics are discussed.

The instruction in horticulture bears much the same relation to the garden and orchard that the above does to the farm.

To the instructions previously given at the Agricultural College, there has recently been added instruction in veterinary. The catalogue for 1883 says:

VETERINARY SCIENCE.—*Anatomy.*—This course will consist of lectures describing the various organs entering into the formation of the animal economy of the horse, ox, sheep, and swine, illustrated with skeletons, diagrams, and dissections.

Zoo-pathology.—Lectures upon the principal diseases of the domestic animals, describing the nature, causes, symptoms, treatment, and prevention of them, illustrated with pathological specimens and individual cases when possible.

Operative Surgery.—Practical illustrations by performance of various operations.

Obstetrics.—Care and management of pregnant animals, attention to the offspring, what to be done and *what not to be done* in different cases of parturition, etc., etc.

Materia Medica.—Lectures upon the actions, uses and abuses, and doses, of upwards of a hundred of the chief medicines used in veterinary practice.

It has long been felt that prominence should be given to veterinary instruction at the College. The almost untold wealth now invested in domestic ani-

mals renders it of the utmost importance that there should be a much wider diffusion of scientific knowledge regarding the care and treatment of animals, their diseases, symptoms, effects, causes, and remedies.

I need not here enumerate the other subjects taught at the Agricultural College; they are similar to those taught at colleges every where. I would, however, notice here that besides the work of the study and the class-room there is a system of manual labor. The student is required to work three hours each working day excepting Saturday. Eight cents an hour is usually paid for this work, which meets, in part, the expense of attending college. It is designed that the labor shall be as far as possible educational. The next important considerations are the preservation of health and the cultivation of a taste for the actual work of the farm and garden. The following is from the catalogue of 1883:

Four years of study, without labor, wholly removed from sympathy with the laboring world, during the period of life when habits and tastes are rapidly formed, will almost inevitably produce disinclination, if not inability, to perform the work and duties of the farm. To accomplish the objects of the institution, it is evident that the student must not, in acquiring a scientific education, lose either the ability or the disposition to labor on the farm. If the farmers, then, are to be educated, they must be educated on the farm itself; and it is due to this large class of our population that facilities for improvement, second to none other in the State, be afforded them.

It is believed that the three hours' work that every student is required to perform on the farm or in the garden, besides serving to render him familiar with the use of implements and the principles of agriculture, is sufficient also to preserve habits of manual labor, and to foster a taste for agricultural pursuits. It has been found in the past sufficient to keep the students interested in every department of farm and horticultural work; and the daily labor of each one, being performed at one time, does not occupy him longer than is requisite for preserving health and a robust constitution.

As regards the experimental work of the college I can only here refer to that in the most general manner. The results of the various experiments conducted are published in my report from time to time in connection with the reports of the several departments. Among the more recent have been experiments with ensilage, both with reference to the cost of preparing and curing it, and also with regard to its value as compared with other food.

The farm has also been experimenting with different varieties of grain. The Board have now under consideration more extended experiments in the feeding of domestic animals than has heretofore been undertaken at the College.

The chemical department has been conducting a number of experiments regarding the food value of different varieties of corn, the proper stage of ripeness at which to harvest wheat; the practicability of manufacturing a marketable article of syrup and sugar from sorghum stalks, and also one of the most difficult and important experiments yet undertaken in the line of Agriculture, viz.: the source of nitrogen in plants.

The department of botany and horticulture has also been conducting some experiments. I am not so familiar with those. They are no doubt adding considerably to our knowledge of the habits of plants.

I have an impression that among the more advanced farmers of the State there is a feeling that the college has not done as much experimental work as it should. More of this kind of work undoubtedly might have been done very profitably. But I doubt whether much more could have been done in connection with the other work that the professors have had to do.

Through the study of nature man has learned the constitution of the atmosphere and the properties of the several elements that enter into it. He

has learned the composition of water. He has learned the constitution of the earth's crust and the properties of its constituent parts and the relative abundance or scarcity of each. He has learned which of these enter into living organisms—how they enter and in what proportion. Science has been gradually bringing to light this very knowledge which necessarily constitutes the basis of a rational agriculture. This rational agriculture is a creature of experiments. It is rapidly gaining recognition, and is affecting our best practices to-day. In a far larger way it is destined to be the agriculture of the future. The old prejudice against scientific knowledge as applied to the operations of the farm is speedily passing away, and the more progressive farmers are realizing that the most important questions are to be solved by chemical analysis, by the microscope, the spectroscope, and the balances so fine as to weigh the minute particles of dust that settle on them; solved by the trained scientist in the laboratory. This being the case the investment which the State has made in laboratories and apparatus at the agricultural college will I have no doubt prove to be among the wisest and most profitable that could have been made. It is our desire and cherished hope that it may prove like the five talents in the hands of the servant in the parable, that those to whom the State has committed this trust may be able to point to their stewardship and say, "behold the five talents thou didst give and beside them the five talents more which they have gained," and that an appreciative public may respond: "Well done, good and faithful servants."

PRACTICAL PHYSIOLOGY.

BY PROF. A. J. COOK.

[Delivered at Otsego and Caro Institutes.]

There is much of kindly feeling manifested in the humorous Irishism of the man who said to his priest, "Indade, sir, I hope that you may live to eat the rooster that shall crow on your grave." A life full of years usually betokens healthfulness and sobriety; and so we may all devoutly wish to live to a ripe old age, and may well desire for our friends a like happy experience. In truth, next to a warm Christian heart, by which I mean a heart firm in the right, and tender in its regard and sympathy for every living thing, there is nothing more desirable than good health and long life. In fact good health is no mean factor in the work of building up a noble Christian manhood. The dispeptic is proverbially cross and disagreeable. There was certainly point in the remark of President Phinney, who upon hearing a young man, in prayer meeting, detail in a solemn, woe-begone style a most gloomy lugubrious experience, said: "Young man you are bilious, you need something to work on your liver." There are few Mark Tapleys among us, and we shall do well if we keep jolly through all of life's labyrinth of wicked, faithless men, and untoward fortune, and circumstance, even if we can in all cases call to our aid a strong, vigorous, and hearty physique. While then we may well follow Christ's command of "Seek ye first the kingdom of God and his righteousness;" we should thereafter lose no time in seeking that second priceless gem, good, vigorous health.

Farming has often been characterized, and rightly too, as the most health-

ful of all vocations. Yet the statistician tells us that the farmers as a class live less years than do those of most other occupations. Physiology shows how and for what purpose the various organs act; and so suggests the requisites to healthy action. Physiology then is the very foundation stone to hygiene. He who would surely conserve his health must be versed in practical physiology. That farmers, whose very business calls them away from the poisonous germs of the city sewerage, the impure water and pent up life of the city, and the confinement which calls into life-giving activity but few of his organs, should lack longevity, only shows that practical physiology is not understood and practiced as it should be by this class. A practical knowledge of physiology may, nay, will do more than to conserve health and promote longevity; it will contribute directly toward the success of the husbandman. The laws of physiology concern not man alone, but the lower animals as well; and that farmer who knows not and practices not the laws of this science as he tends and cares for his stock, is like the workman who hews with unsharpened steel.

One of the most important subjects to which physiology calls our attention is that connected with food. The lately discovered law of conservation of energy applies here as elsewhere. Brain force, muscular force, all organic force directly depends on food, on the nutrition of the organ through whose action the force is exerted. Our own well-being then, as well as the condition of the animals that minister to our needs, depends on the proper digestion and assimilation of foods. Let us study the process and see what practical suggestions we may glean.

Digestion is accomplished in the stomach and intestines. In the stomach, the gastric juice acts on all of the albuminous elements, as muscle, cheese, and the gluten of our bread; while in the intestine the same articles are farther digested by the pancreatic juice, which also digests the oils and starch. This digestion is simply liquefaction, which renders it possible for the matter to pass through the animal membrane to reach the blood, and also fits it the better to be assimilated or changed into tissue. Whenever we use an organ its substance is broken up in part, and for it to continue in good condition there must be close at hand in the blood suitable and sufficient nourishment to supply this loss. The best condition and maximum activity of all of the organs demands ample food, and the most thorough digestion.

The importance of full rations needs hardly to be considered. We all know that to work well we must eat well. The man who feeds his animals liberally not only has fine, sleek stock, but he has animals that can be counted on at the dray or the plow, animals that always bring money, and lots of it at the shambles. The recommendation sometimes heard from the lips of the jockey: This animal eats almost nothing, deserves the retort, then I do not wish him for he will be worth nothing. Intelligent farmers understand that that animal has most merit that eats most, and converts the most of what is eaten into tissue.

It is a more difficult undertaking to point out the precise rations that will be best calculated to minister to the strength and vigor of the several organs. In our own case, no rule is better than the normal appetite. The food that we most relish is the food that does us the most good. This rule enforces the necessity of a variety of food; doubtless for the reason that a variety is more likely to supply the carbohydrates, the fats, the nitrogenous elements, and the several inorganic elements, which are demanded by the healthy organism. The tissues need all of these elements, and so the appetite, the errand boy of

nutrition, calls for a variety which alone is sure to afford the desired nutriment. If unwholesome, innutritious food is made to tempt the appetite, its evil effects upon the tissues, if these are in health, will soon check the desire for this food. In the case of our own food then, I think no better rule can be given than for us to consult appetite, and furthermore that we reject all food that in any way interferes with the perfect action of the vital processes, as indicated by any discomfort that we may feel after eating it. I drink a cup of coffee each day. It is nutritious, I enjoy it, and feel well after taking it. If I drink two cups, I can not say as much. I feel dull, my digestion seems impaired, and my flagging appetite indicates the harmful practice. It is wise and safe for me to drink one cup of coffee; it would be sinful for me to drink two. It is even more difficult to mark out a perfect food regimen for our lower animals. True, we should see to it that their appetites are consulted; and never place food before them which they nose over, and daintily munch, as if every fiber of their organism became tense with indignation at such unappetizing food. A variety of food is only better relished by our cattle and horses, as it better supplies the needed food elements. Economy as well as the welfare of our stock demands that we pay more heed to this matter of the food regimen. We may feed much hay and little grain, and not only stuff our horses so that they will become uncomfortable, and illy prepared for hard physical labor, but we will find the diet very expensive. By feeding more concentrated food, and instead of hay letting straw take in part at least its place, we contribute to economy, and at the same time to the welfare of our faithful servants. From what has already been said, we see that it is wise to feed some hay at intervals, and replace this ever and anon with corn-stalks, and roots. In feeding grain, for the same reason it is well to mix the more concentrated with the less, as corn-meal and bran, or bran and oil-cake.

In discussing this subject, we must not omit the importance of water as a food element. Chemical analysis of the organs shows most graphically the importance of water as a constituent of the tissues. Even the teeth are one-tenth water, while some of the animal juices are more than ninety-nine one-hundredths water. We all know how faint and languid we become, if deprived of water. The tissues at such times are famished and can only voice their needs through thirst. It is not only humane, but it is wise economy to give our horses and cattle water as often as they desire it. Some people consult ease and give their stock water but once a day; others, even more provident of their strength and energy, withhold even this. Sheep, especially, are often left unwatered for weeks in the hottest days of summer, all, forsooth because they seem to do fairly well without water. I can't believe that this is economy, and am even *more sure* that it is cruelty. Now that the patent on drive wells is declared invalid, we may so arrange our fields that a single wind-mill will bring this cheap and most grateful of all food to all our animals. The health, the comfort, and the vigor of our stock makes it desirable that they should never know thirst, summer or winter.

We next have to consider digestion. Our rations may be ample, our food regimen perfect, and yet if digestion is faulty we may still starve. All of our food, except water and the inorganic salts, must be liquified before it can pass to the blood. This conversion into the requisite fluids is termed digestion. It is found that the food elements, the albuminoids, the fats, and the carbohydrates can be as perfectly digested in a glass tube as in the body, if the proper digestive fluids are mixed with them, and the proper conditions main-

tained. As previously stated, pancreatic juice liquidizes all of these elements, while gastric juice aids in the digestion of the albuminoids. It is easy to get these digestive fluids, either by inserting a silver tube in the living animal, or by macerating the proper organs and extracting the fluids by use of glycerine. The proper conditions for this artificial digestion are the normal heat of the body, 38° C., that the food be finely cut up or comminuted, and that it be thoroughly stirred during the process. There must also be a sufficient quantity of the digestive fluids. Thus, by this simple artificial arrangement, we may learn much that is of real practical value. The temperature most favorable to digestion is the same as the heat of the blood, and is beyond our control; indeed needs no control if the body is in a healthy condition. We learn an important lesson from the fact that only finely divided food is quickly and thoroughly digested. This work in nature is done by the teeth, and can only be properly performed by sound teeth, and by taking abundant time to eat. The teeth should never be suffered to decay. It is pleasanter and cheaper to pay dentistry bills than to pay a physician for patching up an overworked and disabled stomach. It is also well to remember that even sound teeth can not properly masticate the food only as they are aided by an ample supply of saliva or spittal. Health then, as well as neatness, urges every man, happily I do not need to say woman, to abstain from any habit that will cause the saliva to run constantly to waste. For this reason, the habit of giving a child candy, as you would air, every waking moment, is most pernicious. More, candy is a ready solvent of the teeth, and is too often responsible for the sad havoc which befalls these important organs, early in life. For other reasons candy should be denied. But say you, what was your rule about appetite? I well know how the child craves candy. The system needs sweets. I would see that the child had at each meal time all it wished to eat of the best of sweets, like granulated honey, and thus feed the hungry tissues without robbing my child of its vitality.

Most of our best farmers are practical physiologists in so much as they grind the grain fed to all such stock as will not properly grind it for themselves. It is more than probable that most of our stock take larger toll in the imperfectly ground grain which is fed to them whole than would be taken by the most greedy and covetous miller. Certainly cattle should never be fed unground corn or oats. The healthy stomach will attend to the churning process during digestion, and needs no aid. We have only to see that it is kept healthy by the necessary care and attention which may be understood and easily rendered. It was stated that in digestion in a glass tube it is necessary, if we would have the work thoroughly done, that there shall be present plenty of the digestive fluids. The same is equally true in the real digestive cavities. It is found that all of these juices are poured out just prior to each meal, in anticipation of the coming event. Heaven's first law is said to be order. If it were man's he would be far more healthy. As I have just suggested, even the organs awake with expectancy, and, like good engineers, light the fires and oil up preparatory for the coming work. The mouth waters, and the stomach, pancreas, and liver keep it company. In truth the entire digestive machinery is set in motion just before each meal. What a waste then if the grist is not turned on as the digestive wheels begin to turn. Hence we should so plan and execute that our daily meals should be taken with the utmost regularity. Society aims to have it otherwise. Too often it is imperative that we say to ourselves: Choose ye this day whom ye will serve, society or health and long life. I can not too vehemently emphasize the importance of the most punctual

attention to every daily habit that is periodic and essays to be regular, that has to do with the bodily functions. It is not only the humane but the patriotic duty of all parents to make the wisest use of both example and precept, that their children may have the importance of perfect regularity stamped on their very being. The piece of cake or candy that seems tied to some children, so constantly is it in their hands, is too often the only cause of the tears and fretfulness that it is given to check. I believe I could truly say that the most common way that we break the Sabbath is by the irregularities that we practice on that day. I believe that there is no single thing in the lives of our sober, industrious, and well meaning people that so makes the black demon of disease, suffering, and short life dance with very joy as irregularity in sleeping, eating, and the sundry other periodic functions of the bodily organs.

Before I leave this subject of digestion and nutrition let me say that the old idea that animal heat is the result of simple oxidation for this sole purpose is no longer entertained by physiologists. Animal heat is the result of functional activity. Certain kinds of nutrition, which are very expensive to the tissues, seem to develop much heat, and are incited by nervous action if there is too little animal heat. By keeping our stock in warm well ventilated rooms during the severe cold of winter we conserve the animal heat, save the expensive nutrition, and add materially to the thickness of our pocket-books. There is no single practice general among our farmers that savors so strongly of waste and destruction as this custom of leaving stock unhoused and unsheltered during the bleak cold days of winter. Go through the country any cold winter's day and you will see good barns, presumably empty, and just outside the pinched up cattle, etc., often by the score. What wonder that each one has its back up? There is good and sufficient cause. These cold driving storms steal the very tissues from the poor creature, and from us our hard earnings as well. Thus thousands of dollars are snatched from our farmers each winter. Why is this? Is it because it takes a little more labor to care for the animals in the stables for 24 hours than for 12, or is it because our farmers do not know what an expensive habit they practice? Is it not more probable that it is simply a thoughtless habit? Whatever the cause the merits of the case demand that we witness as radical a turn around in this matter as we witnessed in the recent political elections.

Of all the food required to nourish the body, none is so imperatively demanded as oxygen or pure air. We know that a person may live at least forty days with no food except water. If robbed of both food and water, the vital forces will continue to act for many days. Not so with oxygen. Stop the breathing and not only does every organ and tissue cry out for this life-giving aliment; but even the heart, the most patient, restless, and untiring servant of all the bodily organs, refuses to impel the life-giving current, and so the source of all nourishment is dried up, and the spark of vital action goes out. We no longer hold that the oxygen is taken simply to supply bodily warmth, but that it enters into the formation of every tissue as an all important component of their substance. We also know by direct measurement that it takes 350 cubic feet of pure air to supply our daily need; or a room, to put it more graphically, seven feet each way, does not furnish the required amount for each day's supply. More than this, each time we breathe the air is vitiated; that is, a part of the oxygen is replaced not by simply harmless gases, but by those that are terribly hurtful and poisonous. How alarming, then, the fact that countless thousands of our fellow beings are living and sleeping

day after day and night after night in small, pent up rooms, with no thought or care to secure the least ventilation; and how suggestive the fact that scores are being mown down by the fell hand of that most ruthless destroyer, cruel consumption. Speak of lowering a window and the poor misguided victim will detail the terrible dangers of the night air and of wind currents. As Dr. Oswald well says, "Before we can hope to fight consumption or stay its terrible progress, we must get rid of this night air superstition. But if night air were bad why contaminate it still further by pouring into it the poisonous refuse from our own breath? Equally erroneous and dangerous are the popular views as to air currents. Better by far let the air currents pour in upon you, which will rarely harm you if you are properly clad and not already enfeebled by neglect of these very rules, than to convert your rooms into a black hole of Calcutta. I have no doubt but that hundreds are destroyed by breathing vitiated air, where one is sent to the grave by both the other causes combined. While I do not believe that strong air currents, even of night air, will do us perceptible harm if our bodies are healthy and well protected, still I would not recommend subjecting our bodies to direct air currents, as we can secure ample ventilation without this. A near neighbor at my old boyhood's home was a man of fine physique. His wife was even stronger and more vigorous than was her husband. They lived in a small, close house with low chambers. Eleven beautiful children were born into the family. These children, especially the older ones, were remarkably strong and vigorous as infants. As they grew older, all were, we might almost say, packed into the small chambers each night to sleep, with no care or thought to ventilate the room. They all became early the victims of that relentless disease, consumption. The oldest alone grew to maturity. Now she with six others are in their graves, while only four remain, and they are all feeling the strong hand of this same dread malady. This is only an exaggeration of what exists in almost every neighborhood. Pure air is the free gift of our beneficent Father; and yet thousands are starving for the need of it, and this, too, in our country homes where the lift of a window simply would supply this pressing need. We ought all to feel as did the man who, upon going to bed at night, felt the air of his room to be oppressive, and so got up, and as he supposed, kicked out the window. He then retired and slept most refreshingly. In the morning he found that he had kicked through the mirror of the bureau.

In every bed-room one of the windows should be open day and night, and should be protected from the storms by shutters. The size of the opening should be gauged by the number sleeping in the room, and by the temperature and character of the weather. The doors of the sleeping room should be open unless there are transoms, and in summer all of the windows and inside doors of the house should be wide ajar. In times of sickness this advice as to thorough ventilation is all the more pertinent. Ill ventilation and supernumerary nurses, or sympathizers are often too much for the most skillful physician and nature combined. In cases of serious sickness, for other reasons than that of ventilation, there should only be one person in attendance, unless more are required to care for the invalid. Who has not seen, in every community, the most flagrant disregard of this rule. Some favorite person is sick, and a half score of anxious neighbors are hanging about the bed-side, robbing the sick-room of the needed oxygen, and unwittingly doing their best to hurry their friend to that beyond where suffering shall be no more. We are often told that that physician who understands and insists on good nursing has won the best skill of the art. Such an one will esteem good air as of more value to

his patients than a whole apothecary shop full of drugs, for he recognizes the fact that nature is the great healer, and pure air the strongest lever that nature uses in the good work of restoring lost health.

The recent discovery of Koch that pneumonia is caused by the presence of vegetable germs, and so is terribly contagious, adds a fearful emphasis to this advice. It also explains the commonly observed fact that whole families are frequently mown down by consumption where there is no reason to think the malady is contagious.

Of course any thing that hinders perfectly free breathing works towards the same end as does ill ventilation. Here then I will briefly allude to the pernicious custom of compressing the chest with tight clothing. Of course the ladies are most interested directly in this matter, but as all men are sooner or later interested in the ladies, they too should give willing ear to this discussion. Men will show more sense and taste when they come generally to admire the normal type of the female form and not the hour-glass type now so common among us. No garment should compress the chest in the least. All garments should hang from the shoulders. Even men need to reform in this respect. I wish right here to protest against the atrocious custom of bandaging children the first year of their lives, as if fitting them to be embalmed as mummies. Too many of them succumb to this swaddling process, and are in truth ready to be embalmed. As a writer, in a recent number of the *Popular Science Monthly*, well says, "This is downright torture. They are swaddled of course; it keeps them from nearly all movement, and paregoric does the rest. They cry for liberty, and receive death. Opiates are sold under right pleasant names now-a-days, and at popular prices; but a spoonful of arsenic would, in many cases, be a shorter and a kinder remedy. The epitaph of many a baby might appropriately consist of these four words, bandages, crying, paregoric, death."

No farmer should neglect this matter of ventilation in the care of his domestic animals. The harmful effects of such neglect in case of sheep are so apparent that most all know and guard against them. Sheep are kept in large flocks, and the many pairs of lungs drawing constantly on the air deoxygenize it so that it very soon becomes utterly unfit for respiration. Thus sheep become diseased and die in a single winter, simply from starvation, when the needed food is not only as free as, but is the very air itself. Sheep, however, need good air no more than do our horses and cattle. As before stated, to keep our stock with economy, we must protect them from the cold. He is the wisest farmer who, while he arranges his barns so that they shall be warm and comfortable, at the same time provides for a constant supply of pure air. Long, close ventilating shafts should be so arranged that the free out-door wind currents shall pass over them and suck the air from the rooms below, and thus keep them filled with fresh and pure air. Better cracks, and wind currents, even if more food is required, than a stifling atmosphere in our stables and stock barns.

In this discussion, I have referred to the fact that respiration not only serves to furnish the most important food, but acts another very important part, that of removing the noxious excretions, as the carbonic acid and organic substances, which if not removed from the blood, become most active poisons. Other poisonous excretions are poured out by the skin. Neatness and cleanliness are absolutely necessary to the full removal of these harmful excretions. Farmers, from their constant press of duties, their isolation, and the amount of labor and care requisite to keep the whole place neat and tidy, are some-

times careless in this respect. But want of neatness, and good health are never in accord. Under this head we may well consider neatness of person, neatness of dress, and neatness of surroundings.

Physiological research has demonstrated the truth, that the body preserves a nearly uniform temperature in all of the unexposed tissues of about 38° C. (100° F.) Health, aye, life itself, demands that this be not suffered to rise or fall beyond very slight limits. The reduction of the temperature of the blood, however, is not so speedily fatal as is its elevation. Bernard found by experimenting with mammals that death did not come till the blood was reduced 15° or 20° , while a rise of 7° was certainly fatal. Therefore we see that it is not only wise but imperative to life itself to keep cool. The body is a tremendous heat producer. Even in ordinary temperature, with moderate exercise, enough heat is generated to raise the temperature of the body 3° or 4° per hour; enough to kill were there no counteracting influence, in two hours. To prevent this great caloric engine, the body, from burning us up, there are stationed on its surface over 2,000,000 little sweat glands. These little sentinels are thickly set all over the body. Each sweat gland is a tube 1-16 of an inch long, but so many are there, that this fire brigade is constantly using two and one-third miles of hose. From these there is thrown ample sweat—mostly water—to quell the internal heat, even of the laborer toiling hard under the hottest sun of summer. The giving off of sweat, or perspiration, is the means by which nature keeps us from burning up. In this intricate but admirable system, nature has provided such perfect machinery, that it is left for us only to keep the hose in good order. We should not suffer these pores to become clogged. This demands frequent bathing. It is a sin for a person, who knows better, to let a week go by without a bath for the entire body. Two baths are better, and most fortunate is that person, whose early training, or habits of neatness, impel him to perform daily this luxurious and health-giving ablution. The temperature of the water for bathing, may vary from cold to tepid, depending upon the comfort of the individual; though to those who feel no shock in its use, cold water is doubtless the best. The morning is the best time in which to bathe, but if one feels too weary and restless to sleep, a warm bath just before retiring, will promote sleep, and do him good. After the bath we should rub the body quickly and energetically, with a not over fine towel, till it is wholly dry. With the glow consequent upon this friction, comes a sense of comfort and pleasurable stimulation, surpassing intoxication, for it leaves no sting behind. In case a person is constantly foul with the emanations of tobacco smoke, from which poisonous filth the body is constantly striving to rid itself through these self-same sweat-pores, then these all-over baths should be all the more frequent and thorough. I would urge upon every person that he make of himself, each Sabbath morning, a clean receptacle for a Sunday breakfast, "for cleanliness is not only next to Godliness," but a clean body, and a clean garb are absolutely essential to that Heaven-like rest which the Sabbath is made to give.

For the same reason, no one should wear clothing without frequently changing it. Clothing worn too long becomes saturated with the excretions and exhalations from the body, and thus effectually locks up the pores of the skin, and not only prevents the necessary perspiration, but shuts within the body with a murderous grasp those poisonous excretions which it is the province of these sweat pores to remove. Every neighborhood has its examples of men who seem so engaged in their pursuits that they forget to change their garments for days together. Such persons become loaded with nauseating

emanations, and really become a nuisance to those of more cleanly habits. This habit is almost sure to be coupled with neglect of bathing, which two habits form twins of most ungracious mein.

No person ought to sleep in the same garments that he wears through the day. Undergarments should never be worn more than one week without change. To be sure they are hid from view, but that will be poor comfort to one who knows his duty and has a conscience. The plea of economy is even more inexcusable, as long life, both to the garment and the wearer, demands the frequent cleansing of this inner clothing. The same argument holds for the purification of the bed clothing. Happy the person who never knows that stifling atmosphere which hangs as a cloud in the sleeping room of the uncleanly. Like a lumber camp, or the slums of a crowded city, where bathing is unknown, and where the clothing comes off when it falls off; the very air is loaded with the seeds of disease and death, which "still as the breeze but terrible as the storm" only wait for a little brief time to victimize those who tolerate their terrible presence.

For inner garments, or those that are worn next to the body, nothing is so wholesome as woolen or flannels. These are sieve-like, and permit the ready escape of the poisonous emanations from the body. Those who have once tried them are slow to set aside woolen under garments, even for summer wear. Hold a thick woolen blanket over steam and note how readily the vapor passes through the meshes. The passage is not so free with cotton or linen, while a bed quilt shuts it off as surely as does rubber. Ventilation then is a term which can be applied in speaking of the clothing. Even the outer garments ought not to be too long worn without change and airing, or they too will become foul with the excreted refuse of the body. We are told that in the New Jerusalem there shall be clean robes; what a glorious transmutation will that be to him who has dwelt in dirt and filth during all his earthly sojourn.

It is now a well established fact that some of the most terrible of our diseases result from our inhaling putrescent germs! Thus an imperfect sewer or a filthy cellar is the nursery where are sprouted the fungoid spores, which bring diphtheria, typhus, and scarlet fever into our homes, and carry away our loved ones. Foul drinking water often in the same way, hangs the crape on the door, nor does it discriminate, but gathers up the rich and poor alike.

We see then that our surroundings should be looked after with an eye—the nose may often aid greatly in the search—quick to seek out the noisome matter. The farmer, in fact every householder, should look personally to the thorough drainage of his place, to a cellar inoffensive at all times to the most sensitive nose in the community, to the thorough drainage of all low places about the home, to a generous space separating sties, barns and their yards, from the house, and—very important—such water-tight vaults, and dry earth closets as will render the out-houses inoffensive to the last degree at all times, even during the sultry days of midsummer. The bottom of the vault should be made of plank, or better of artificial stone, so that no water could pass through it; the vault should be well ventilated, and in the room above, close beside the seat, there should be a dry earth bin, with a shovel and dry road-dust always in it, and a neat door, opening just above and at one side of the seat. The floor of the bin should slant down to the door. Another door outside permits the easy filling of the bin with the dry earth. The whole seat, as well as the special lids over each opening, is hinged to the back so as to be easily raised up. The water-tight bottom prevents any drainage, so there is

no danger that the well shall become polluted. The exercise of suitable care makes it possible to have this room in the wood-shed, as I know by experience, without any offense at all. At the bottom of the vault outside is an arched opening, which permits easy cleaning. This is covered by a lattice-work, which is hinged at the top. If plenty of the road-dust is used at proper times, there is nothing disagreeable in cleaning the vault.

There can be no better guide in all this matter than a good delicate nose. Never tolerate within the house, or about it, any of those disgusting, putrescent odors which are heaven-sent messengers to warn us of danger and harm. By a little care and attention, every home may be as sweet as a May morning and as clean and healthful as the mountain air, and though such care may make the physicians speak of the times as distressingly healthy, it will as surely fill our homes with joy and gladness.

The most wondrous part of our organism is the nervous system, or the great coördinating apparatus. This is the system that makes the parts of the body act as one, and also forms the track along which sympathy runs from one organ to another. Thus bad news at meal time stops the digestive machinery; an unpleasant sight at the table incites nausea, while wet feet cause headache or diarrhea. In infants this nervous sympathy or reflex action as it is called, is far more active. The mere cutting of a tooth the first year of the infant's life, especially if in hot weather, often causes functional disturbances that result in death. Thus at such times the greatest care should be exercised. The utmost regularity of habits should be preserved, no change of food suffered, nor any change or experience that would in any way add to the disturbance already begun. Ignorance in these matters has caused many a death, or what is often worse, serious epilepsy, which made life a burden to the victim and to its friends.

It is also because of this delicate network of nerves that all shocks or abrupt changes that effect the bodily functions are apt to result seriously. Under this head, as it comes as the very god of disease to the farmers as a class, I give a first place to exposure. In our climate, especially in spring, the weather is as capricious as a bachelor with gout or dyspepsia. Sultry summer and severe winter chase each other like shadows as they sweep over fields of grain, while damp is ever near to lay her clammy hand upon the waiting victim. The careless person, confronted by sudden cold or the equally dangerous damp, is robbed as by a violent shock of the natural heat of the body. The minute vessels are thereby paralyzed; reaction, fever, diarrhea or congestion of the lungs succeed, and too frequently right here are sown the seeds of long wasting disease, or what is not quite so dire, speedy death. And this all from the lack of a pair of rubbers, an overcoat, or from the premature removal of woolen undergarments. Farming, as already stated, has often been characterized, and justly too, as the most healthy of all vocations, yet the statistician informs us that the farmer lives less years than do those of most other occupations. How are we to reconcile these seeming contradictions? By the obvious fact that of all people the farmer is the most indifferent as to exposure. His carelessness in this respect is often terrible; more, it is criminal. Let the lawyer or the physician practice the same degree of exposure, and their occupations would soon be without patrons. Wet feet from morn till night, drenched with rain for hours at a time, exposed to the most sudden changes of temperature with no thought of added clothing, are common experiences among the farmers of our goodly Michigan. He was an exceptional farmer in thrift and comfortable surroundings, no less than in the matter of conserv-

ing health, who remarked to me not long since, "We never have too many rainy days to suit me. They are blessings to every farmer who has learned how rightly to use them. I, said he, never expose teams, men, children, or myself to the rain. Such days are best used in fixing up indoors, but most valuable as excellent time for brain cultivation." Let me urge upon all that exposure to the damp or cold acts most energetically, through the nerves, to disturb the circulation, and when we remember that all nourishment comes to the tissues through the blood, and that all the ashes, if we may use the term, which result from vital action, and which for the most part are virulent poisons, must be removed by the same circulatory system, you will see that I have urged none too strongly the importance of guarding well against the evils in question. To sum up I would urge all most strongly not to walk in the wet without water proof boots or good rubbers. Always guard against getting wet, and if you chance to get your clothing wet remain active, or better still, make all haste to change for dry clothing. Put on flannel under-clothing early in the fall, and be slow to put it aside the next spring. Delay the putting off of flannels till you are certain that spring has surely come, though you may feel a little discomfort at times. Do not pack away the overcoat till well into May or June. Be careful never to go into the cold unprotected or sit in a draft of air when you are very warm, and thus in a state of perspiration. At such times and for a similar reason it is dangerous to drink very heartily of cold water. Of course many will say, "Oh, I am not going to fuss like an old maid; I'll run the risk." Remember that those unfortunates that are feeble and diseased have to take these precautions most studiously to live at all. Be slow to adopt and persevere in a course that has dethroned their healths, and which may make you their companions in suffering ere you are aware.

I have already stated that the taste was the best guide to the kind of food most desirable. In meeting this demand of the appetite, however, we must, if we would avoid all nervous shock, call the judgment to our aid. When we are very warm and thirsty the tissues need water. We crave drink on this account. We will not be satisfied until the water is absorbed from the stomach, and is distributed to the famished tissues. This is a quick operation, but not an instantaneous one, and so a gill of water will often bring the same relief that would be furnished by a quart, though for the instant we crave the whole quart. On the other hand, the bathing of the vessels of the stomach in a quart of ice water may give a fatal shock to the system, or produce chronic inflammation, perhaps in the feet, which in the horse we denominate founder. Over eating, on the other hand, is not impelled by any such vehement desire, and is simply the result of gross, unrestrained gluttony. It is also because of this nervous sympathy that it is dangerous and sinful to eat food that does not relish. It is not simply moral obtuseness that makes one rebel against innutritious, unwholesome, poorly cooked, and unappetizing food. Every protoplasmic cell in the body cries kick, you are wronged. It is found that at the imposition of untoothsome food the spittle dams up in the salivary ducts, the gastric juice utters a protest by its dribbling flow, the pancreatic follicles strike for better substance to work upon, and the very blood seems to call for a halt as if indignant. What wonder then if in this general indignation meeting the temper also loses its balance. If a person ever has a right to be indignant it is when he is confronted with strong butter or sour bread. Perhaps Paul had just risen from such a meal when he said, "As much as lieth in you

live at peace with all men." We do not need a great variety at each meal, but what we do have should be cooked in the highest style of the art.

It is found that sorrow, anxiety, grief, and anger are each and all strong breaks upon the digestive functions. Such passions check the secretions, hinder digestion, and induce dyspepsia. On the other hand joy and mirth and all pleasurable emotions quicken the bodily functions, so that even the stomach and other viscera laugh at the work of liquefying the food, and dyspepsia finds no foothold. Good nature and a happy spirit at the table, are indeed the very best condiments, and will do far more to promote digestion than will indefinite mandrake pills, or even quantities of bottled up pepsin. Do not think that the good wife or daughter, who, with deft fingers makes the table upon which she spreads the daily repast so beautiful that it is a joy to sit around it, is foolishly employed. Wise, too, is that father and blessed his family if *his* good example makes the clean coat hide the sweaty, dirt-begrimed shirt, at each meal time. Such home courtesy as is betokened by the ever donning of the coat at the daily meals means more than directly added pleasure, it means added health.

As already suggested, the nervous organism is the most delicate, easily disturbed, and yet the most important part of the body. It is to the system what the wires are in telegraphy. Most to be commiserated is that person whose nerves tingle with irritation, at every passing breath, and tear and lacerate, even at the beck of imagination.

Sleep, full and ample, is the great conservator of nervous force. Most of us need full eight hours of this God-given elixir. Do your eyelids fairly fight the will power that strives to open them at the dawn of the morning? Then take more sleep. Does every drowsy nerve, in languid utterance, rebel as the morning clock-stroke calls to action? Then go to bed earlier. Do the tired energies refuse sleep when you betake yourselves to bed? Then work less and sleep more. Many an indulgent but very foolish parent hurries his children on to nervous imbecility by permitting them to retire at all hours, and thus rob the body of the needed rest. This breaks up all regularity of rising and eating, and makes the fiendish god of disease dance with joy. Richardson well says, "Sure am I that no man, however strong, seeks sleep at irregular times, or for diminished space of time, without paying the penalty in reduction of energy, and in shortness of life. Let none of us dare indulge habits that shall become the Glamis that hath murdered sleep."

It is well known to physiologists that freshly injured cells are quick to mend, while those long diseased become sluggish, and refuse often to heal at all. As I am urging towards habits that shall carry the vigor and bonyancy of youth into old age, let me urge you all never to dally with acute troubles till they become changed into that ruthless plague, chronic disease. Hope and ambition are often two terrible enemies; they cause us to pay little heed to the cough, the ill digestion, the troublesome headache, or the inflamed eyes, till alas! we are bound down by a life-long malady, or hurried out of the world at the dawn of manhood, when a little care or a few days rest would have carried us hearty and strong to a vigorous old age. If position or gain, hope or ambition, ever urge you to neglect disease in its incipiancy, regard them as the offending eyes, and pluck them out, or the evil hand, and cut it off.

In my schedule for this lecture, I had planned to close with an arraignment of those two arch murderers of our time, whisky and tobacco. I wish I had time to point out how they too often walk hand-in-hand in the black, horrid

work of destroying digestion, of striking down nutrition, of blighting the nervous force, of poisoning the tissues throughout the body, of making conscience fool with duty, of thickly strewing the country with that tripple monster, sorrow, disease, and death. These evils not only induce some of the most deadly of diseases, but even worse, the poisoned tissues and corrupted taste are transmitted to the children of those unfortunate ones who indulge these pernicious habits.

How many nerveless hands, unsteady brains, inflamed lungs, disordered stomachs, sluggish livers, and inactive kidneys are to-day crying out because of the cruel grasp of these monster habits, no one can tell. Says one of the greatest physicians of London of the lesser of these evils, "Why should a million of Englishmen be living with stomachs that only partially digest, hearts that labor unnaturally, and blood that is not fully oxidized?" In a purely philosophical point of view, we must say that the existence of such a million of imperfectly working organisms because of the indulgence of a most filthy habit, is no less a national absurdity than a national calamity.

In the interests of health, no less than those of purity, refinement, and patriotism, we ought all of us, by earnest precept, and more potent example, to urge in strongest accents against these unnatural habits, which, to our sorrow be it said, are rapidly becoming as common as they are pernicious.

CHEMISTRY IN HOUSEKEEPING.

BY FRANK S. KEDZIE.

[Read at Berrien Institute.]

As citizens of one of the most refined nations, and living in the nineteenth century, we aim to act and live scientifically, and die only when science and breath fail us.

Chemistry, as a practical and economic science in its relations to the arts and manufactures, is supreme. Every day we learn of some new application of some chemical principle to some process of manufacture; and modern life has learned that it owes much to the weary, unremitting toil of the historical alechemical enthusiast over his Dutch oven, his ugly crucibles and awkward alembics, amidst poverty, suspicion of too great familiarity with the devil, and the reproaches of an unphilosophical spouse.

Useful as chemistry has been, and wonderful in its advancement at the present in the arts, it is with extreme slowness that it is applied to domestic life. The reason for this delay is apparent when we consider that domestic life had to exist before either art or science. The preparation of clothing and of food was necessarily a first attempt without any guiding principles, and succeeding without principles at first, made the principles seem unnecessary as time went on.

In all the transactions of the Royal Society of Great Britain, of early years, you will not find a hint of why we raise bread, nor why mix grease and lye to make soap, but you will find that they talked about interstellar space, etc., and adjourned for dinner with a trusting faith that everything was all right at home—and whether anything was left in a vacuum after you had exhausted

the air, was a question which would not influence the flavor of roast beef, nor prevent the potatoes from being mealy.

Now-a-days people of an intelligent, inquiring nature are aiming to reduce everything to principle—to do an operation right, and also to know why it is right; and here especially in the life of our homes and their surroundings chemistry can yield its place to no science.

In the limits of this article I shall only attempt to illustrate as well as I may be able some few things chemistry can throw light upon in the common every-day life of our homes.

Let us suppose that like some favored guests, we are invited to “go around and see the house;” we will saunter through an imaginary mansion, out into the dining-room, prowl around the kitchen, investigate the cellar, peer into the pantry cupboard, go down the back steps, look at the drain, taste the well water, examine the soap-kettle, and generally make ourselves quite free with an ideal domestic establishment.

As the smell of cooking is inviting, especially at about this hour of the day, let us turn our steps to the kitchen and pantry first. As we enter, the sound of subdued sizzling comes from the oven. “Yes, there’s a roast of beef in there.”

“Did you have your oven hot at first?”

No; not very.

“Well, you should, and you want some water in the roast basin.”

Why?

Because the meat wants to retain its juices and not contribute them to the gravy; so you must seal up the pores on the outside by a quickly applied heat, and to do it without burning we must have water in the pan to keep the heat from being too high, and still make it a “muggy day” for the roast beef. Dredge flour on, too, to help seal things up.

In a chair by the stove is the bread just about ready for the oven. It is one example where prohibition will never prevent the manufacture and use of alcohol. Every loaf of sweet white bread is the result of a small but exceedingly active brewery. The yeast plant as it induces fermentation in the dough, converts the starch of the flour into sugar, the sugar is then made into alcohol and carbonic acid—then it is light and ready for the oven. The carbonic acid gas is the thing sought for in all this process of setting the sponge, kneading and keeping the dough warm.

Flour is composed of two principal things, viz.: gluten and starch. Gluten when obtained pure, is a tough, dark-colored substance looking like and having many of the characteristics of glue. Its office in the flour is to retain the minute bubbles of carbonic acid gas formed during the fermentation process and thus make the bread light and porous.

Many times the flour is found to be dead—that is, when it is set to rise it doesn’t rise. This is found usually to be on account of bad milling—the stones being set too close and the heat thus caused destroying the tenacious property of the gluten.

If we wait too long before putting the dough in the oven, the alcohol doesn’t wait for us but goes right along and makes acetic acid and the bread is sour of course.

Carbonic acid gas being the means used for making bread light, why can’t we, you ask, use baking powder and make just as nice light bread? There are two good reasons why you cannot. The first is that you never can mix the baking powder with the flour as thoroughly as the constituents of the flour

are mingled in nature and in the process of manufacture, sift as many times as you please. And the last reason is the carbonic acid is liberated from the baking powder too quickly to answer the purpose. Just as soon as the flour and baking powder mixture is moistened the carbonic acid gas is liberated, and be as expeditious as we may in wetting up the material much of the gas escapes. On the contrary the process by fermentation takes place after the flour is wet up and the whole of the starch does not undergo conversion at the same time but rather in a succession of molecules.

"Can't we make our own baking powder at home better than we can buy it?" If you should ask that question of the Domestic Economy Department of any of our weekly papers they would answer "yes," and proceed immediately to give you "an excellent recipe." Ordinary baking powder is made of cream tartar and bicarbonate of soda united in such proportions that they will exactly neutralize each other—liberating all the carbonic acid which the soda contains, and leaving no excess of cream tartar to make biscuit or cake sour, nor any soda to make it alkaline. United with these two materials is usually from 10 to 25 per cent of rice flour or corn-starch to keep them slightly separated and prevent the absorption of water and consequent weakening of the powder. If the materials used are both chemically pure the following formula will be correct: Sixty-nine parts cream tartar, 31 parts soda, 10 parts rice flour. But neither the cream tartar or soda obtainable at drug stores is always chemically pure and of uniform strength. How much weaker than the absolutely pure article cannot be told, as it varies greatly; so much so that an analysis is generally necessary to determine the correct proportions to be used. A good way is to buy of a responsible grocer and take well known brands, declining steadfastly chances in tea sets and dinner services if you want baking powder. In this connection I may call attention to the excessive and unscientific use of soda as indulged in by many house-keepers.

To impress the district school teacher who "boards 'round" with the high quality of his boarding place, it is usual to place before him some hot biscuit of extra quality, in the composition of which the case knife of the hostess has been four times heaped with soda, to the intense yellowness of the resulting biscuit. The acid used to liberate the carbonic acid from the soda, being the never failing "cup of sour milk," into which the soda is plunged, and and then beaten for two or three minutes, so as to make the biscuits extra nice for the teacher, allowing in this manner about half of the valuable carbonic acid gas to escape before the addition of the flour, and the wetting up process completes the material ready for the oven.

The error of the cooks of to-day, in most farm houses, is too much soda—and too little discrimination in its use. The evil is also encouraged in many instances, by the recipes in the papers, giving directions frequently for using from two to three teaspoonfuls of soda, where much less would be sufficient. Of course, if there is enough sour milk used to neutralize the soda, the evil is not great; but the tendency is to use too small an amount of sour milk, and too great an amount of soda. The strength of the acid of sour milk varies enormously—because of the judgment of the cook. What is called very sour to one, will be only "just a little turned" to another, so that the strength of a "cup of sour milk" may be represented, usually by the mathematical X—denoting unknown quantity. A safe rule is to use one small teaspoonful of good soda to the quart of flour. It will, when skillfully neutralized with either cream tartar or sour milk, furnish sufficient carbonic acid gas to make the flour abundantly light.

Leaving the kitchen and looking into the pantry cupboard, we find some inviting looking rows of canned peaches, pears, plums, etc.; they were put up hot from the kettle, well sealed, and so far show no signs of the presence of those miserable little spores, whose growth and development into active living plants cause the fruit and the housekeeper both to "*work*."

The whole question of preserving food is to keep it away from those aggressive, sly, pertinacious little atoms known as bacteria; they are little, but mighty in numbers and influence.

Any substance which will destroy these bacteria, and protect food from their attacks, will preserve the food. As an experiment, a piece of fresh beefsteak was exposed to the fumes of burning sulphur for about fifteen minutes and then hung up in a room, near which another piece of steak was placed without being subjected to any treatment. The weather was moderately warm, and the piece of steak which was unprotected spoiled in a few days, while the piece that was treated with sulphur did not show signs of decay until nearly two weeks had elapsed. The "Ozone Preservation Powder," advertised so extensively three years ago, was composed of sulphur and a little lampblack, and was successful so far as sulphur can be in the preservation of animal substances. Within the last year attention has been freely called to a new compound called "Rex Magnus"—a substance manufactured by the Humiston Food Preserving Co., of Boston, which shows, by a very handsomely engraved picture, that Time is conquered, and you may put up preserves by this process for your great-great-great-grandchildren with perfect propriety, and with full faith that when eaten by the aforesaid relatives will be found to be perfectly fresh in flavor, not to be distinguishable from the freshly plucked fruit. This substance, which has placed old Father Time at such a disadvantage and mixed him up so that he has had to fix his hour-glass over, make it smaller in the neck, and otherwise adjust it to the new standard time, is a compound of boracic acid and glycerine, both well-known substances; the former, boracic acid, having been in use in Sweden for years as a preservative of milk, meat, etc. Boracic acid has long been used as an antiseptic, but the feasibility of its general use as a preservative for food must be judged by the light of experience, and not entirely by the result of a few experiments. Everything that will preserve food and not destroy its flavor may not be wise nor safe to introduce into the digestive apparatus day after day as food, we have enough sources of dyspepsia already, and it will perhaps be well to be a little slow to adopt new preservatives of this nature until more thorough investigation and trial in regard to their final effects make it appear safe to enter upon their general use.

Away up on the top shelf of the cupboard I see some tumblers of something that looks like jelly. "Now what makes those queer, hard lumps in my old currant jelly?" What is it? It's what has been spoken of lately, it is glucose. Yes, you made it yourself without any expensive machinery. You just added white sugar to some currant juice, boiled it, set it away up here and it was done. These little lumps removed and carefully washed would be found to be exactly the form of the sugar found on the exterior of good raisins, and hence called grape sugar, or glucose. This material is made by all housekeepers when they cook acid fruit with sugar. Being only two-fifths as sweet as the original sugar there is a waste in this respect, and it can be avoided by adding the sugar after the cooking process is about finished and the material ready to be remove from the fire. On the top of the jelly tumblers I notice there is a piece of thin, white paper to prevent mould. It doesn't do it, how-

ever, but you can easily do so by dropping a lump of paraffine in the centre of each tumbler immediately after you have filled it, and while it is still hot enough to melt the paraffine and form a continuous film on the top. This exceedingly cleanly and useful substance is easily applied, and will exclude the air perfectly.

"Sometimes I don't have any luck with my jelly, and it won't set, or rather get hard." That is because the fruit you used was too ripe. The juice of fruits just ripening contains a peculiar substance called pectose, which by being heated for a time will solidify upon cooling. As the fruit continues to ripen this pectose is converted into pectin, which has not this valuable property of becoming jelly. It is necessary, therefore, to insure success in jelly making, that the fruit be not dead ripe, on the contrary it should just be approaching ripeness. If the expressed juice is left in contact with the mass from which it was expressed it absorbs more pectose from the tissue composing the mass and is then more easily made into jelly. As we pass out of the pantry I notice the sugar barrel standing in one corner, there is instantly brought to mind the bane of modern existence—glucose again.

"How can we tell whether our best granulated sugar contains glucose?" I should say that you could not unless you have a mind to experiment and really become an analytical chemist in a small way. Fehling's test by the reduction and precipitation of copper is the old fashioned way, and the use of polarized light in a saccharometer costing about \$100, is the new way; but here is a simple little test that is so easily applied that it will be found quite useful (Picrate Potash). Aside from this test large adulteration can be told by the tendency of the sugar to lump in the bowl.

As it is getting late let us adjourn to the back yard and look at the leach and soap kettle. Among the many joyous signs of spring and the return of the budding flowers and glad voices of birds, the smell of soap boiling holds a front rank. But why do we go to all this fuss to make soap? Why isn't the lye as it comes from the leach just what we want—what is the use of saving old grease, aged butter, poor tallow, to mix with lye to make a substance to be used in removing this same grease from dishes, clothes, woodwork, tables, etc. That is the natural inquiry but if you should use the lye you would find of course that it was too strong. It removes grease; certainly, but it also takes the skin off the hands of those using it. It takes dirt off the woodwork; yes, and the paint too. It removes the dirt from soiled clothes; yes, and destroys the fabric of the cloth more than a year's wear would do. This over zealous disposition of the free alkali in lye from leached ashes is overcome and made more conducive to our convenience by uniting it with an acid and converting into a very slightly alkaline or nearly neutral salt—and this salt or chemical combination is soap.

If we consider the substance known as tallow to be a chemical combination of the stearate, margarate, and oleate of glycerol, we will perhaps be able to understand the changes which occur when lye is boiled up with soap grease. Agreeable to the law of chemical attraction the stronger bases of the lye, that is, the potash and soda, replace the weaker base glycerol, and we will have formed the stearate, margarate and oleate of potash and soda, which is soap, and the oxide of glycerol or glycerine, as we call it, will be formed.

This soap, after it is thoroughly well made, retains its strength indefinitely. Exposure to the air does not measurably weaken the strength of the alkali, as would be the case were it uncombined; and, besides the merit of stability, it has the great one of portability. When this stearate, margarate, and oleate

of potash and soda is put into water, it does just what we would like to have it do—it is decomposed; the alkali is set free, as free or only partially combined alkali, and the fat acid is left uncombined in the water. This is soap-suds. The fat acid set free is no longer a greasy substance, but is simply perfectly inert, serving, however, in the washing of cloth, to make the surface smooth, and in this way assist in sliding the dirt out into the water.

The alkali set free, is ready, willing, and anxious to attack anything in reach—dirty dishes, clothing, grease, etc. These it attacks, and entering into chemical combination with the grease again, it serves, by the assistance of a little friction, to eradicate it, and is thus a “means of grace” in our higher civilization.

Going up to the leach we find, laid carefully upon the broken down, rheumatic, old chair, that is near by, an egg, which looks as though it had suffered severely. Yes, the lye must be strong enough to hold up an egg (this familiar fruit being the one domestic hydrometer common to all conditions in life); and even then, when it would do that, I’ve known the lye not to make soap. In one instance, our neighbors, after working about a week with the lye—testing it with the true instrument, the well authenticated hen’s egg, boiling the lye down some; then, being afraid it was too strong, watered it a little, but no soap. Losing faith in ashes, lye, grease, soap kettle, and all things of good, soapy repute, they, with desecrating hand, broke the egg—yes, smashed it utterly. Their worst fears were realized; it was downright, utterly, superlatively, bad, and had been so some time. A logical deduction from this sketch, would be to test your egg first with bright, clear, sparkling water; not on the temperance question, but on the question of moral soundness and sterling worth of character. “But some lye that will float an egg won’t make soap.” Yes, but you must have then neglected to put the required layer of quick-lime in the bottom of the leach. “Well, what is that for?” “What good does it do?” The chemical combination law comes in again right here. Unleached ashes, whether fresh or old, contain their alkalies in the form of carbonates. These carbonates are alkaline to a certain extent, but not to the full extent that they are capable, as part of their alkalinity is destroyed by the union with the carbonic acid; but if you will bring these carbonates into contact with quick-lime, the stronger base, lime, will unite with the carbonic acid, setting free the potash and soda in the condition of caustic potash and caustic soda, which is the state in which they are capable of exerting their greatest alkaline strength, and which is secured by quick-lime placed where the lye must flow through it on its way to the kettle.

Hard soap differs from soft soap in being mostly composed of the stearate, margarate, and oleate of soda, instead of corresponding salts of potash. To make soft soap into hard soap we must displace the base potash by soda, and we do this by adding common salt to the material while it is still boiling in the soap kettle. The soda of the salt unites with the fat acids of the soft soap and forms a soda soap, setting free the potash which is obliged to combine with the chlorine of the salt and form chloride of potash. Upon cooling the mass in the kettle the hard or soda soap separates out and is ready to be cut up into bars for drying.

When we started upon this tour of domestic review we promised ourselves that we would go down cellar. It is a place that much attention is directed towards in seeking the causes of sickness, but we will only go down to smell of the butter and see if it is sweet. Well, here is the butter, and upon examina-

tion I find it is "just a little turned," but a little with most people is enough and with a good many too much.

Among the many questions which seem never to be definitely decided the reason why butter gets strong is very prominent, but by carefully conducted experiments it has been fully established that the little bacteria are again the offenders, and that protection from them insures the sweetness of the butter. The majority of farmers during the butter producing season put down the butter in crocks or pails. They use plenty of salt, which helps greatly; but if they realized that floating in the air the germs of strong butter were hovering near—no, actually getting to work—they would protect the butter from the air, by either sealing it up in glass or more economically covering it over in the crock with strong brine, through which the bacteria rarely are able to pass.

Butyric acid, which makes strong butter, is never formed except when the butter is exposed to the action of some ferment, and this ferment is these bacteria germs coming universally from the atmosphere. Salt on the top of a crock of butter will not exclude these bacteria. A saturated brine around the butter will protect it.

It is not customary for guests to part from the host at the foot of the cellar stairs, but I feel that I've detained you too long already with this Iliad of domestic woes, and thanking you for your kind attention must beg to be, excused at this time and place.

DISCUSSION.

In reply to the question, "is boracic acid injurious to health," Mr. Kedzie said that its use for preserving milk had been prohibited by the health officers of Boston, although the extent to which it is injurious is not yet determined.

In response to a question asking at what temperature bacteria were destroyed, he stated that the exact temperature was not known, 300° would not kill the germs.

WHAT SHALL WE READ?

BY MISS NETTIE F. WOOD.

[Read at Eaton Rapids Institute.]

Sir John Davy divides our friends into three classes, men, women and books.

Books should be selected with as much forethought and care as any personal friend, and when chosen in regard to their pleasure, helpfulness, and integrity, they become friends in letter and spirit. Since the invention of the printing press in 1850, or thereabouts, books have rapidly increased until thousands, aye millions, have sprung into existence; we can but marvel at the progression and cease to wonder why people do not know what to read and become discouraged before they commence.

Americans as a class read much, but too often is it the case the latest whim of Madam Fashion, that exciting game of base ball, or the fastest time on record, has been beaten; or some great crime has been committed, and if the

criminals have not already been caught, the officers are on the lookout, takes what spare time a person has, until one will exclaim with disgust: It is all right to read something nice if one only had the time, and I might add, disposition. When everything goes with a rush, there is a time for everything that has will power to *push*. This will once aroused is a fierce antagonist and will save time by improving it, and giving much raw material a chance for thought and reflection to weave into garlands of strength and beauty. Thinking makes what we read ours, yet we necessarily read much that we can't remember, and why shouldn't we? We can't remember what we had for breakfast a year ago, or a month ago, still it satisfied the system and did its allotted work. We want memory to be our servant, carefully looking after our best interests.

Good works are not only pleasant companions, but are the true levelers, giving to all who desire the society of the best and greatest of our race.

William Channing says: "If writers will enter and take up their abode under my roof, if Milton will cross my threshold to sing to me of Paradise, and Shakespeare to open to me the worlds of imagination and the workings of the human heart, and Franklin to enrich me with his practical wisdom, I shall not pine for want of intellectual companionship, and I may become a cultivated man, though excluded from the best society in the place where I live."

Yet in order to have any book an accessory to true culture there must be personal enthusiasm, personal work, and at most, the friendly adviser can only stimulate or suggest wise and just decisions. Ruskin divides all books into two classes, books of the hour and books for all time, and warns us not to allow the books of the hour to take the place of true books. They partake too much of the spoken language of conversation, while the book is written with an idea of permanence rather than communication.

A good library will not only arouse but strengthen the thirst for knowledge, and adds much to the comfort of the home circle; possession adds to appreciation, and in this day of literature, when standard works can be purchased at reasonable prices, there is little excuse for not having a library unless the will be lacking. A few volumes a year will make a collection well worthy of praise in time, yet how many of those here to-day have annually averaged the purchase of two good books for general culture during the past ten years?

When we hear dealers talk about books being used as furniture, or selling them by the yard or car load, or receiving orders for a library of such and such dimensions, so many feet of shelves to be filled with elegant volumes, then are we more than ever convinced that a library needs to grow with the owner's mind, one at a time perhaps, yet that one thoroughly mastered.

There is one commandment that if faithfully observed would help much toward general education. It was Bishop E. O. Haven who said "When the religion of Christ shall become the religion of the world, when all mankind shall remember the Sabbath day to keep it holy, I believe there will not be a knave nor a fool on the face of the earth." If you have enjoyed 21 years of life, you have had three whole years of Sabbaths; if 50, seven. How much of the time given us for self discipline, comparatively free from the worry, cares, and troubles of what we shall eat, or wherewithal shall we be clothed, has either been snoozed away in a good Sunday afternoon nap, or otherwise allowed to pass idly by; and one of poor Richard's maxims was, "As we must account for every idle word, so we must for every idle silence." A notable example of what a wise use of the Sabbath can accomplish, was given a few

years ago by the master of the State Odd Fellows. His address was considered a masterpiece, and when asked what college he attended, said he never had had the benefit of any collegiate course, and what education he had was due to reading and hearing good sermons and lectures. Sunday afternoons and many evenings were spent reading, with a dictionary as a constant aid to become familiar with each new word and its use. As a book of reference, a dictionary is indispensable, and should at all times be easy of access, and if satisfied with mere facts, we should want nothing better than Webster or Worcester unabridged.

Literature has five great divisions, religion, history, science, poetry, and romance. Each has its place, one takes preference with one, another will choose something else, yet no one vocation covers all more than ye tillers of the soil. Every where about you, you can see the hand of a wise Providence, sowing and reaping, seed time and harvest. History and science are closely allied; what has been done can be done, and still there are new fields for exploration. Poetry and romance, well they give variety and by the pen set forth the beauty everywhere about us and give us ideals that are truly enabling. Holland's Kathrina, and Meredith's Lucille exert an influence over all with whom they come in contact and when we have the voice of what is the best in humanity speaking to us, we must continue our acquaintance with the poets. We must become familiar with the events of the day through the medium of the papers and periodicals, while the book to read is not one that thinks for you but one that makes you think. All will not want the same, for there is too much individuality. History is ever advantageous and the events and dates will have new attractions, if some good biography or work of fiction can be read with it. Alexandria in the fifth century will seem far more real after reading Kingsley's Hypatia.

Scott's *Ivanhoe* will carry one to the third crusade and give an insight into the character of Richard I. Tennyson's *Queen Mary* throws light on one of the greatest persecutions on record, while Dickens' works do not have any direct historical value; hedwells on extremes, making them all the more desirable. What is richer than his take off on the American eagle? Among other things, he would have it drawn like a Phoenix, for its power of springing from its ashes of faults and vices and soaring anew into the sky. Again he thought the officers in the American militia must command each other, if not where did the privates come from for there seemed no one without a title. Let us look in our own history and see where biography assists in the establishment of facts. William Penn's life shows arbitration better than bloodshed, and his treaty with the Indians the only one never sworn to and never broken. Washington became a father to his country all the more by following his career from the French and Indian war till he was in the first presidential chair. Franklin is identified with early printing. The contests for Texas independence are vividly set forth in the life of Sam Houston, and political life awakens new interest, when prominent factors have become familiar through spoken language without any account of wire pulling.

The report of the librarian of the public library of Chicago gives some figures that if other cities equal it, no wonder man made the town. He gave the whole number of volumes taken out for home reading during the year as 252,801, a daily average of 1,161. Of these 63 per cent were English prose, fiction, and juvenile works; eight and 45-100 history and biography; three and 51-100 voyage and travels; six, science and arts; four, poetry and drama; twelve, in continental languages, and three per cent miscellaneous. We have no means

of knowing the tastes of those living in rural districts, for at the best the number of books to which we have access is limited, and at times it is Hobson's choice. When we have a good library in every school district, and many already have the nucleus where we see leading men of the day like Dr. Vincent and his colleagues interesting themselves to make history and allied reading compete with fiction; when we see reason demanding something real instead of sensational, then shall we expect to see different statistics from those now shown by our public libraries. Although history is the backbone of all knowledge, its ribs spring forth to embrace not only mere facts and dates but art, science, poetry, travels, language, and whatever has been in use in the past relating to our improvement and advancement. Nor would I exclude good works of fiction, for they introduce us to different classes of society, new places and people, and various customs; but to read nothing else tends to frivolity, conceit, and little power of concentration. There is always something good in every book; perhaps only a few lines to be remembered, the balance to be forgotten or skipped, and proper skipping, never overlooking that which is of use, is truly an art obtained by few. Too many can say of a book. I have read it, and when asked what can you tell of it, why I know, I know I have read it. Few mistakes will be made in proper selection of books if one will let common sense decide as to what are wholesome and helpful to him personally then read carefully, regarding parts if necessary until you are familiar with the text. We must not forget the periodicals and newspapers, for they contain much that is brightest and best of our literature. We can ignore the story papers that neither instruct nor amuse and not lose anything, but every one should have general, State, and local news, and papers allied to his particular branch.

Our better nature demands that our reading shall be broad, deep, and unfailing, theoretical and practical, something, that if "Civilized man cannot live without cooks," intellectual man cannot live without books and papers. Much might be said and yet the half not be told. I fear I have already trespassed on the time of the institute for I was warned to be brief, hence I ask your indulgence.

EDUCATING FARMERS' BOYS.

BY N. P. LATTÄ.

[Read at the Otsego Institute.]

It was somewhat strange to me just why a lawyer, who is in no sense a farmer, should be honored with any position at a farmers' institute; but this I do know, that I esteem it an honor to meet the intelligent farmers of Allegan county, assembled at an institute like the present, to discuss important questions of agriculture, and if my fifteen years' experience as county superintendent of schools, and as a teacher, has qualified me in any measure to say anything that will benefit any one here to-night, it will give me the greatest pleasure.

When we come to consider the importance of agriculture, we are led to conclude that it is the source of all other pursuits, and that we are interested in making its profession a success. How to educate the farmer's boy, and keep him on the farm cannot be arrived at in any way by the adoption of any set

rules. Intelligence must guide the toiling hand. My experience has led me to believe farmers' boys are somewhat more tractable than other classes of boys; that our best men grow out of this class of boys. In order that all boys should get the best education possible for them, I would send city boys into the country to breathe pure air and acquire good habits, such as no other place affords. The country boys I would bring into the village, that they might mix with their vigorous constitutions and steady habits, good business qualifications. I do not wish to be understood that I think farmer boys more dull and less ready to learn than other boys. The question was not given because it was thought they are hardest to educate, but to ascertain, if possible, the kind of education they are to receive to keep them at home on the farm. I would commence with the home-circle and rural school, since one-fifth of the boys receive at these places all the education they ever get. The home training is of the greatest importance, and ought not to be neglected, for the thoughts that go with us through life, are those picked up around the fireside. The home influences should be first, and the rural school supplementary.

These schools should receive the attention of the best minds in the country and the earnest support of every farmer. They are attempting too much at present, are going beyond the needs of the average farmer and business man. Charles Francis Adams, jr., thinks that none of the foreign languages should be taught in public schools. They should teach nothing but the common English branches; and, as necessity is the mother of invention, she will teach all who really desire more. Every child should commence at the lowest round. He should learn to speak his mother tongue correctly; and in this not all learn equally well. There are none born natural orators. If you wish a boy to talk, teach him to talk. Talk to him. If you wish a boy to sing, teach him to sing. Sing to him. I know it is frequently said that some boys can not learn to sing. My daughter had a bird that was kept alone in a cage and it didn't sing. She tried all the nostrums that were said to bring out the singing quality in birds, but all failed and she really thought the bird couldn't sing. She finally put into the cage another bird that could sing, and it was but a short time before the bird was singing as nicely as any. Music should be taught and practised in every family, for a boy is not all he should be until he can be moved by the harmonious strains of sweet music.

The boy should know the rules of arithmetic. I was surprised, a few days ago, in looking over an old author's work on arithmetic, to find all the rules you would find in any modern work. Then they made a specialty of arithmetic, and I think primary arithmetic should be taught to-day as thoroughly as it was forty years ago. He should have a knowledge of the rudiments of geography and history, and should know how to keep simple accounts.

Farmers as a rule do not keep accounts. They should not only keep their business accounts but should open and keep accounts with all departments of the farm.

The seeds of the boy's character are planted at home and at school before he is twelve years of age. The home and the rural school furnish the means of a good education to every boy. But you say, perhaps, that it does not furnish *enough* to every boy. I answer that after the boy acquires a good rural school education, and really desires more, he is in good shape to obtain more and will have it.

After I was informed that I was to talk on this subject this evening I com-

menced glancing around for information, and in coming from Allegan this evening with my friend, Dr. Way, I thought I could obtain a little light on the subject from him; but he said his knowledge had cost him both time and money, and he would not impart any of it without proper remuneration. So I failed there. One farmer I talked with said the best way was to put the boy into a cast-iron box and lock him up; another said chain him up. Now I have never had very much experience in farming. In fact, the only real farming I ever did was done here in Otsego. I kept a garden and planted it to potatoes and other garden truck. I also kept a Chester white pig, for which I bought corn meal. The hair all came off from the pig. My neighbors said I had fed it too much meal. But it finally became fat enough, so I thought I would kill it. So I engaged a professional butcher, and after we had killed and dressed him and cut him up he put the pig, all but his head, into a two-gallon jar. I have had a little more farm experience, however, which I will relate. I worked for an old gentleman once, on a farm, at \$14 per month. This old gentleman was a hard-working man, who never talked with his hired help or boys about his work or his business. He sent his boy John and me to a field to mow. That was when people used the "armstrong" mowing machine, and neither of us knew anything about it. The consequence was that John, the first stroke or two he made, jammed the scythe into the ground and broke it. The old man, instead of coming to the boy and showing him how to use the tool, got very angry over the matter and was about to kick John. Now this kind of treatment to boys I hold to be all wrong. Fathers should take pains to instruct their boys. Every farmer who has boys should have a workshop and a set of mechanic's tools. We boys had more than ordinary liking for such tools. My father was a mechanic and had a set of very fine tools. At one time, I remember, when I was a boy, I got into his tool chest and was making sad havoc with his nice augurs and saws, building windmills; but before I had finished my mill my father came in. Well, he corrected me in the usual manner. A father should accompany his boy as well to his play as at his work. The home and farm should be made attractive and interesting to him. He should never be obliged to go from home to receive the comfort and pleasure he longs for. The home should be a pleasant place. It should be the place of the greatest enjoyment to the boy. The best amusements should be furnished him. I am not much of a dancer, and don't believe in dancing very much; but if a boy must dance the father should go with him. Boys should be taught that they are a part of the family. I have staid at farmers' houses where the heads of the family, the girls, and myself occupied the sitting-room or parlor, while the boys sat in the kitchen.

The best thoughts that go with us through life are those implanted by our mothers and picked up around the family fireside.

AGRICULTURE IN THE COMMON SCHOOLS.

BY MRS. R. F. JOHNSTONE.

Our common schools are the boast and pride of every American citizen. In them children of foreign parentage become practically Americans, with American instincts and predilections. The bias toward any business or belief or practice is best formed in early life. Religious propagandists understand this, and are careful that the early training of children shall be under the direction and influence of their particular sect or belief. The early Indians became hunters and warriors through the practice of mimic warfare, and mimic exploits with the bow and arrow, through the whole of the childhood of the youngsters. Boys who are set to declaim or write essays at school, and are kept at it term after term, very likely develop into budding Byrons or embryo Homers, or acquire a taste for stage, oratory, and statesmanship. If at school boys should be set to whittling out jumping jacks, wood carvers would be more plenty, and so with every business; what the child practices he is likely to get a predilection for that will incline him toward it when he comes to manhood. If the boy stands at the blackboard and illustrates continually practical examples in commercial life, or figures out problems in insurance, or banking, or brokerage, the wonder should not be why he should develop an early liking for trade, and become dissatisfied with farm life, but why so many become farmers. He can't see where he can apply the skill in which he has become an expert to the processes of the farm. His father, if a farmer, never has submitted to him a problem for solution that had reference to the business of the farm, and indeed he would be as little prepared to aid him as he would to translate Choctaw from the rules in his arithmetic. Why algebra should be taken and botany left out of the curriculum arranged for common schools cannot be satisfactorily explained when it is known that 90 per cent. of the scholars attending them are farmers' sons and daughters, and that the funds for their support come largely from the tax on real estate owned by farmers.

From the study of botany in the common schools there would very likely develop experts in the science, who would take pride in naming all the strange grasses and weeds which grow on the farm, and they could indicate the probabilities of their usefulness, or otherwise. The common schools of the State stand among, and are surrounded by botanical specimens illustrative of the study, and no prettier sight could be met than a group of boys and misses with hands full of grasses and plants, discussing their classification and names. Vegetable life is now so little known and understood among farmers, that the grossest mistakes are often made through ignorance of the laws governing it. A knowledge of physical botany would explain how plants are influenced by the several agencies of light, heat, air, and moisture. It describes their various secretions, and the nutriment afforded by the soil. It explains the circulation of sap in a plant, and shows how its structure is built up from the salts in solution, sent along its veins to the leaves, where the pure water is evaporated and the thickened sap returns to form stem, leaf, flower, and fruit, and the root itself. All this knowledge pertains directly to the business of farming. A skillful botanist would delight in applying his skill to the practice of out door life on a farm. If the mind can be pleasantly occupied while the hands are busy, labor is shorn of its terrors, and the mental sag in the intel-

lectual machinery of farmers so likely to occur, will be less preceptible. There are periods in the history of every country when the study of agriculture becomes more urgent. A step upward is necessary to reach the level of other industries. That point is now reached by the farmers of America. The pursuit of agriculture is the only occupation in which no special training is considered necessary. This is the more surprising when we consider that out of the pupils of our common schools, more than fifty per cent of them will become farmers, yet no special effort is made to fit them to worthily fill their places, but instead, the entire influence, in so far as their studies can influence them, is directed toward some other occupation.

The study of chemistry is popularly supposed to belong to and be an adjunct of the sciences only, and, indeed, it has long been the servant of these higher studies. That it is the right hand supporter of agriculture would not be credited by farmers generally. Agricultural chemistry introduced into the common schools and made a part of the every day tasks for the term, would not only be very interesting to farmers' boys and girls, but would lay the foundation for such practical knowledge of farming as would tell in future years, and help out in solving the intricate questions of to-day. It would explain the character of soils, and analyze their parts. It would tell how crops grow and feed, and teach what was necessary to their perfect development. It would explain why a potato sprout in a cellar is used as a simile for the weakling of the family, and why it climbs so high to reach the light. It would give the necessary healthy condition of soil to produce maximum crops, and indicate the degree of maturity at which plants should arrive before they are secured and stored. These questions are now vague guesses at the best, with ninety-nine out of every one hundred farmers in the State, while they are all supposed to know something of the practice of mercantile life, and the elements of practice in the business of almost every other profession. The success which has attended the growing of flowers from seeds on school grounds, where the teacher has evinced sufficient interest in the enterprise to secure the seeds, is proof that botany as a study would be a success. Much praise is due Secretary Garfield, of the State Horticultural Society, for this, the first innovation in the old routine of the last forty years.

Every influence attendant upon the schools is to create the impression that education has for its ultimate aim, the making a profession of some kind the business of life, and farmers hang their heads in the presence of such men, from the conviction fastened upon them in early life, that the doctors, lawyers, and divines have achieved success, while they have not. Let education be turned, especially in the common schools, toward making farmers out of farmers' children. Teach them that an educated farmer is as much a success as an educated lawyer, and entitled to the same consideration, both socially and politically. Show them that it is of as much importance to know the component parts of the earth beneath their feet, as to know the countries meet in their order in a circuit of the earth. If it is essential to know something of the structure of man and of animals, it is quite as important to know how plants are built up, upon what they feed, and why they fail and die. If the trick of conjugating a verb can be learned, agricultural chemistry can be understood, and what is better, become of practical value.

SOME DEFICIENCIES IN COUNTRY SCHOOLS.

BY PROF. E. L. BRIGGS.

[Delivered at Eaton Rapids Institute.]

The old log school-house, with its row of benches and desks around the room next the wall, its fire-place, and its numerous chinks between the logs for thorough ventilation; and the old red school-house, with its hand-carved desks and seats, its blackboard standing in a semi-recumbent position against the wall, its ceiling low and dingy, and everything thoroughly browned by the escaping smoke from a defective pipe or chimney, and its bundle of birches standing just in the rear of the master's desk—these were the school-houses that adorned our rural districts but a few decades ago. Indeed they have not all disappeared yet, for it is still possible to verify the truth of Irving's description of the building in *Sleepy Hollow* by actual observation.

But these relics of an earlier day are rapidly giving place to the new white school-house, with its green blinds, its cupola and bell, its commodious room and patent folding seats, its extensive blackboards, and respectable supply of necessary apparatus. Amid these improved surroundings are the boys and girls of the country to-day taking their first gaze into the unbounded perspective of intellectual development. It seems to me that improvements in school buildings have quite outrun improvements in house buildings. There are no school-houses being constructed to-day in the developed country which are not desirable places for the children to spend the pleasant hours of the day in study. But has the advance in the returns accruing to the children kept pace with this progress? I claim, and make the statement with the sincerest regret, that there is far from being in our country schools to-day, that greater intellectual impetus, and more extended knowledge given to the pupil which the improved facilities demand.

It is to examine some of the reasons for this failure that I appear before you to-night. Our country schools are institutions worthy of no slight consideration. They are deserving of the deepest interest, not only of their immediate patrons, but of the State at large, for in them about half the children of the State are to-day being educated.

And has not our State in many ways recognized the importance of this primary education? Is it not being constantly proclaimed, and with unanswerable argument, as the bulwark of American liberties? And do not the annual dividends yielded to our districts from the primary school fund indicate a careful fostering of these interests by those who have preceded us?

It is more pleasing to speak of the grandeur of our free school system and its beneficent influences upon the individual and the State than it is to find fault with some particular parts of its great organism. Yet a careful knowledge of the failings of our institutions must always precede their reform.

One of the most disastrous things in the management of the country schools is the carelessness and indifference shown in the employment of teachers. These schools are the places of experiment for the vast multitude who are testing their abilities to teach. A large majority from failure or dissatisfaction soon leave the ranks, while others finding in themselves a love and aptitude for the labor secure the deserved promotion; and so the course repeats itself. New material is being constantly thrown into the teaching force of the country to

be tested, but as soon as marked ability is shown it is demanded for the more desirable and more remunerative positions of the village and city schools.

Our district boards do not thoroughly investigate the qualifications of the candidates desiring their schools. Often they are quite unfitted for such investigation. I have frequently heard this statement made by the director, "You are the first applicant and your chances are excellent." How frequently precedence of application takes the place of preëminence of fitness. If a farmer were raising a superior breed of horses or sheep he would not entrust their care to one of no experience or special preparation in the management of horses or sheep; and yet his boy, before whom are all the possibilities of American citizenship, he often places, for his education, into the care of one who has no previous preparation, except that she has sufficient knowledge of certain books to secure a certificate from the board of examiners.

It is not enough that a person holds a certificate to qualify her for teaching. Her knowledge of the child's mind and the order in which knowledge should be presented to it, her power of self control and ability to manage, her knowledge and culture, her own character and the force of her moral influence are all essentials which the examiners cannot determine. Then again the larger proportion of those seeking employment in the district schools have no desire to become teachers. They only keep school for a few terms waiting for something better to turn up. They wish to secure the pecuniary necessities for further study, and are hoping soon to prepare for some profession offering brighter prospects for a career or a fortune. Or they desire means to dress in better style and so gain a more prominent place in society. Any of these notions are worthy enough in themselves, but when considered as the reason for entering the teachers' ranks they are deserving of much criticism. Our district boards do not protect themselves from teachers having no higher aims than these, and many failures result from the insincere labors of such teachers.

Another serious defect in the country schools is the constant changing of teachers. Our farmers apply one good agricultural principle in the management of their schools, that of rotation. But unfortunately the principle does not prove as successful with teachers as with crops. In the districts surrounding our city the teachers are employed for terms of two, three, or four months, and it is a rare exception if they are reëngaged for the same school. They must spend the greater portion of that time becoming to a degree familiar with the work they ought to do, and when they have just come to a fair realization of the scope of their labors, and before they have been able to do themselves or their school justice, the term is ended, and they are allowed to seek employment elsewhere.

Let us investigate the course of our neighboring schools in this respect. District No. 5, of Eaton Rapids township, maintains its school for three terms during the year, these corresponding closely in time to the city schools. But for the last two years no teacher has been engaged for two consecutive terms. In former years the same lady has at times been retained for spring and fall terms, but such action appears to be quite exceptional. Think of it! Six different teachers for the children to become acquainted with in two years. Are we expected to look for systematic progress amid such arrangements.

In District No. 15 of Hamlin township the terms are the same as above. In the past two years three ladies and three gentlemen have successively filled the place of teacher.

District No. 1, Brookfield, still follows the ancient custom of one winter and one summer term. Here the change has been regular for three years

previous to which one gentleman taught the school three successive winters, which terms were, however, interspersed by as many different ladies for the summer.

No. 2, Brookfield, retains this winter the same teacher that taught the summer term, but this is the first exception to a regular change for at least three years.

In Aurelius the condition is not improved, for in No. 6 three different persons have been regularly placed in charge of the school each year for about seven years, and in No. 7 of the same township a like rotation prevails. These schools, taken as they are in every direction from the city, are not exceptions.

I believe from my acquaintance with neighboring schools and teachers that these illustrate fairly the average condition. Is it any wonder that our country schools do not show better results? The marvel with me is that they accomplish so much.

It is impossible for one teacher to take the work just where his predecessor dropped it. It takes time for him to adapt himself to his new relations; it takes him more time to find out what his pupils already know; and it takes still longer time for him to determine the capacity of his pupils, and so conform his instructions to their abilities and peculiarities as to secure the best results. Teachers, like human beings in general, are all different. No two persons will instruct alike; no two will govern their schools alike; no two will have precisely the same conception of educational principles, and the result of all this change is that the schools are left by each successive teacher with only about half the progress that should have been made. I have indicated that, in my estimation, many who seek positions in our schools, are unworthy of re-engagement. Many do not work with reference to a re-engagement, and their work, on this account, is not done at its best. School boards should prefer teachers who wish to remain a series of terms with their schools, and, when the first period of employment is ended, if they have done earnest, conscientious, satisfactory work, re-employ them with a reasonable advance of salary. From my own experience in the supervision of school work, I am convinced that the earnest teacher, desirous to succeed, will perform her work twenty per cent better during the second year than the first. Both the teacher and the school should reap the benefit of this improvement. In no other instance are men more inconsiderate of business principles than in respect to the instructors of their children. If the merchant's clerk has served him faithfully during the year, his salary is advanced, and the returns are as great to the employer as to the employé. This principle applies everywhere in successful business. Why should it be so thoroughly discarded in reference to the schools? The business man owes much of his prosperity to his long-trusted, reliable, well-paid clerk; and by applying the same methods, our farmers could make the schools in their districts more than doubly prosperous in a single decade.

In many of the districts the terms are not arranged to give to the schools the choicest seasons of the year. Some are still clinging to the plan of a summer and winter term and the sessions of the school are continued during the sultry months of July and August. The fine days of September and October, among the best in the year for successful school work, are given up to vacation. The impropriety of this arrangement needs no illustration and there is no reason for its continuance. Let our country schools begin in September for the year and continue for a fall term of three months; begin the winter term of three

or four months in December; and then finish the year with a spring term, beginning as soon as the roads become fairly settled; place one competent person in charge of the school for the entire year, and good results will not be slow in manifesting themselves.

A deficiency of no small importance, but which is receiving but trifling attention is the entire absence of grading and classification in the country schools. There exists no system in the order of studies. No records are kept showing what pupils have accomplished in previous terms. No end is placed toward which they shall progress, and no limit is set beyond which they are forbidden. From this lack of system there must of necessity follow irregular, haphazard, and deficient work. Pupils take such studies as they prefer, which preference is often the result of the encouragement of a previous teacher. They are allowed to pass from one study or branch of study to another before a reasonable degree of thoroughness has been attained. And much that is essential to a fair primary education is being constantly neglected. Most children prefer arithmetic simply because it is the best taught of any branch in school, and they are gratified in this taste to the exclusion of reading, language, writing, history, and science. While a knowledge of the English language is the most important thing in the curriculum of our schools, it is least regarded. Pupils who come to our graded schools are invariably deficient in language, and must be placed two or three grades lower in this branch than in arithmetic, where they frequently have a fair proficiency.

Arithmetic is of great importance, it is true, in this primary education, but there is no reason for its absorbing the lion's share of the child's time. He will use speech a hundred times where the problems he has learned to work in addition, multiplication, fractions, and interest come to his service in not more than a single instance. In business his ability to use correct language in letter, and in speech will be primary elements in his success. In his enjoyments, the appreciation of the best in literature, coming from an early direction of his taste, will form a prominent part. The child's mind must be guided in many channels, but no one must be worn too deep. In order to overcome this danger, at least a careful *classification* of every school should be made. A course of study should be prescribed and a careful following of it by pupils and teachers should be demanded by the school authorities. Moreover, a record of every pupil in the work pursued during each term should be a legacy of each teacher to his successor.

The last defect in our country school system to which I shall call your attention is the absence of all competent supervision. The township school inspector, whose duty it is to visit all the schools in the township each term, is seldom capable of giving any assistance to the teachers of the township, because he is no critic of school work. During the few years in which our State maintained the system of a county superintendent of schools the district schools made marked advancement, wherever the office was conferred upon a competent person. Every teacher expected his work to be scrutinized and criticized, and the expectation was an incentive to him to do his best work. The schools of the whole county were to a certain extent united, and there sprang up a healthful competition between them. The superintendent was able to determine the qualification of teachers to do actual work as well as to answer questions.

Under the township system which followed most of these good results were lost, because few townships could furnish competent men who were willing to

attend to the interests of the schools for the low remunerations offered. Our present system is an advancement upon the latter, but has this serious defect, that those who form the examining board and grant certificates have no opportunity of visiting and superintending the schools of those they license to teach. On this account, they can know nothing of their qualification except what is indicated by their conduct on the day of the examination and by the correctness of their answers. Could one of the members of this board devote his entire time to the visitation of the county schools, many defects resulting from lack of system and insincere teaching might be abolished.

The country schools of Indiana just over the State line are regarded by those best prepared to judge, much superior to those of Michigan, simply because of effective supervision, while our graded schools are not outranked by any State in the Union. The creation of such an office is inevitable in the future progress of our country schools.

In conclusion, I wish to urge upon the patrons of these schools the fostering care that is due to them. Your boys and girls, well equipped in mind and heart for life's duties, are the most valuable legacy you can bequeath to posterity. The preparation you have had may be quite insufficient for them in the closer competition of the next half century. While you are giving to them better buildings and more delightful surroundings, do not neglect the weightier matters of systematic, efficient teaching.

DIRECT AND INDIRECT TAXATION.

BY CHARLES F. HOWE.

[Read at Berrien Institute.]

MR. PRESIDENT, LADIES AND GENTLEMEN—The subject to which your attention is called in this paper is taxation, direct and indirect.

Taxation, as considered in this paper, is what we pay for the support of our government; what we pay for the salaries of our public officers, national, State, county, and township; what we pay for building our national and State institutions, and the expense of maintaining the same in practical working order; the care of the deaf, dumb, blind, insane, and those who transgress the laws of our land.

The subject of taxation ought, and I have no doubt does interest every person present. It is the duty of every one to know, so far as it is within his power to know, that the money paid in taxes is economically spent, for the purposes for which they were levied and collected. It is their duty to know whether all classes of property bear their just proportion of the burden of taxation, and if such is not the case, it is the duty of every good citizen to take all lawful means to amend the laws in this direction.

Direct and indirect taxation are so dissimilar in their workings that they must be separately considered.

I first call your attention to direct taxation. Webster says a direct tax is one assessed directly upon our possessions. You who have in your possession a receipt for taxes paid perhaps have noticed that the taxes are classified as State, county, township, highway, and school taxes. There may be others,

but those enumerated are the most important. Many of you are familiar with the manner in which our taxes are levied and collected, but perhaps it would not be amiss to state briefly some of the more important operations by which we arrive at the amount of taxes each person shall pay. First you are called upon by an officer called a supervisor or assessor, who takes an enumeration of your property and places a value upon the same. This valuation goes before a board of review, who raise or lower the valuation wherever in their judgment they think best to do so, and each person is taxed in proportion to the valuation of his property upon the assessment roll, as fixed by this board of review. The valuation of all the property in all the townships in a county is presented to the board of supervisors, who equalize the different townships by adding a per cent to those that are too low and deducting a per cent from those that are too high. These equalized amounts are the basis for apportioning the State and county taxes among the several townships.

For the purpose of determining the amount of State tax that should be apportioned to each county in the State there is a State board of equalization that meets once in five years. Each county presents to this board a statement showing the amount of all the real and personal property in the county as equalized by the board of supervisors, and from these statements the State board equalizes the different counties by adding to or deducting from, as the case may be, and these equalized valuations forms the basis for apportioning the State tax among the several counties.

Perhaps a few moments spent in reviewing the different amounts that make up our State and county taxes would not be misspent. For this purpose I will read you the items in the State tax for the year 1883.

For the State University.....	\$77,700
For the State Normal School.....	30,815
For the State Agricultural College.....	32,178
For the State Public School.....	45,800
For the School for the Blind.....	68,150
Institution for the Deaf and Dumb.....	64,575
State Reform School.....	45,000
Industrial Home for Girls.....	65,856
House of Correction.....	7,200
Insane asylums.....	274,950
Board of Fish Commissioners.....	20,000
State Board of Health.....	2,000
For military purposes.....	57,271
Relief of sufferers by fire of 1881.....	68,900
Paving Cooper street, Jackson.....	3,300
For general purposes.....	610,975

Making a total State tax of..... \$1,474,672

Of this tax Berrien county pays \$27,544. The items that make our county tax for the year 1883 are as follows:

Delinquent and rejected.....	\$818
Stenographers' fund.....	600
Agricultural societies.....	600
County poor.....	4,000
Jury fund.....	1,000
Insane asylum.....	1,000

Officers' salaries.....	\$6,500
General expenses.....	13,000
Total county tax.....	\$27,518
Total State and county.....	55,062

In view of this large outlay for taxes, would it not be well to look at this question in its various aspects, and if possible ascertain what we may reasonably expect for the future.

To ascertain whether or not our taxes have increased in the past, I have tabulated the tax upon a piece of land in my own township, beginning with the year 1857, and ending with 1883. This piece of land was all under cultivation in the year 1857, and there have been no improvements by way of buildings or otherwise added since. It seems to me that this must tell the story. I have figured this tax by the acre, thinking it will be more easy to understand:

	Cents Per Acre.		Cents Per Acre.
1857.....	11	1871.....	61
1858.....	11	1872.....	31
1859.....	14	1873.....	30
1860.....	12	1874.....	28
1861.....	19	1875.....	31
1862.....	25	1876.....	28
1863.....	27	1877.....	32
1864.....	50	1878.....	32
1865.....	72	1879.....	35
1866.....	53	1880.....	30
1867.....	36	1881.....	35
1868.....	50	1882.....	28
1869.....	62	1883.....	42
1870.....	52		

You will see by this statement, that the taxes on this piece of land for four years before the war, was on an average 12 cents per acre; during the war from 27 cents to 72 cents per acre. From 1872 to 1883 the tax is very even, and we may presume the tax has settled down to its normal condition again. We find the tax for twelve years since 1871 to be on an average 32 cents per acre; almost three times as much as they were before the war.

Shall our taxes increase in the future as they have in the past? If I had given this subject thought before testing it by facts and figures, I should have said that the improvements in this country would advance as fast as there was any need of an increase in expenditures; and I believe they will do so in the future. You know that a parcel of land in a state of nature pays but little tax, and yet when this land becomes improved, and is well stocked, has good buildings and is well supplied with teams and tools necessary for its cultivation, its capacity for taxation is greatly increased.

Then, again, think of the manufacturing establishments that have been built within the last twenty-five years, all over our land, together with capital brought into our State in other business pursuits, and the rapidity with which the northern portion of our State is becoming settled and improved, would warrant us in believing there would be no necessity for an increase of taxation in the future. Again, our State is well supplied with nearly all the public buildings needed, and they are mostly new, substantial buildings that

will not need rebuilding for a long time to come. It does seem to me possible that there might be a reduction in taxation for State purposes, if strict economy is practiced.

As to our county taxes, I do not see any necessity for their being materially increased in the future, except that the people of Berrien county, cannot much longer postpone the building of a county court-house, when for a few years you may expect a higher rate of taxation.

What can we do to prevent a further increase of taxation? We should require all officers to be honest and faithful in the discharge of their official duties; see that they spend no more time in their official capacities than necessity requires; place in positions of trust men who have established a reputation for honesty and uprightness, and who value their reputation as far more binding upon themselves than any that could be imposed by legal bonds. Whenever you find it necessary to build at the expense of the tax-payers make your buildings permanent, then you will not be compelled to tax the people again to replace the same improvement in a few years. Teach the people that it is as much a wrong to steal from the public treasury as it is to steal from one's neighbor, and then compel all officials to act in accordance with such teaching. This would be a step in the direction of reform, and there is no reform that would be more acceptable to the people at this time than a reform in taxation.

As this is a meeting of agriculturists, perhaps we had better consider briefly whether *they*, as a class, pay any more than their just proportion of the taxes of the nation.

The majority of farmers do not own any taxable property aside from the farms they till, and the teams and tools used to cultivate their farms. This is property that is visible to the assessor, and not one dollar in five thousand of this kind of property escapes his vigilant eye. This is not the case with those whose property is in notes, mortgages, stocks, and bonds. This class of property is easier to conceal from the assessor, and a large proportion of this kind of property does escape taxation. In fact I have known owners of this kind of property to change their place of residence for no other reason than that their financial affairs were too well known to the assessor where they formerly resided.

How many of you believe that the merchant, manufacturer, lawyer, doctor, or the banker pay taxes on more property than they are worth? I do not think there is one present who has any such belief. How is it with the farmer? Many of them pay taxes on two or three times as much property as they are worth. It is the desire of every farmer—and it is a laudable desire too—to own the land he tills, to have a place he can in every sense of the word call home, consequently when he becomes possessor of sufficient wealth to pay one-half or one-third towards a home, he generally buys, and is virtually a half or one-third owner, and yet he must pay taxes upon the whole value of the property. He hopes by hard labor and strict economy to be able, some day away in the future, to pay the other half or two-thirds value of this property, and become absolutely its owner. Now he is no more than a half or one-third owner and yet he must pay the same tax now as he will have to pay when by years of toil he adds the other half or two-thirds to the value of his estate.

Is it right to thus hamper a man who is striving to become one of nature's noblemen, the owner of the land he tills and the roof that shelters himself and loved ones from the chilling winds of winter? How is it with the men

who own the mortgages upon the farm property of Michigan? Do you believe it is all entered upon the assessment rolls? I know it is not?

I know a man who gave a statement of his personal property that was satisfactory to the assessor and to those living near, and yet when this estate came into the hands of the probate judge it was found that he was paying tax on just one-fourth of his personal property. If such a large amount of property escapes taxation where all the circumstances are favorable, what may we expect under ordinary circumstances where mortgagee and mortgagor live long distances apart, where much of the business is done by agents, and where many other things tend to mystify and make it necessary for assessors to accept just such statements as are given them. But, says one, the law says the assessor may swear any person making a statement. Very true, but when the law says a thing may be done you can rest doubly assured that it will not be done. If that little word *may* had been *shall* it would have been of some use in obtaining a full statement of this class of taxable property. The taxable property of the State of Michigan is eight hundred and ten millions of dollars. Governor Croswell, in his message to the Legislature in the year 1881, says the interests that pay specific taxes, and those which are exempt from taxation, are fully four hundred millions more—thus you see there is only two-thirds of the property of the State of Michigan that goes upon the assessment roll for the purpose of direct taxation.

What about the property that pays specific taxes? I find that nearly five-sixths of the specific taxes are paid by railroad and street railway companies; about one-sixth by insurance and mining companies. There are a few other interests that pay small sums, but none of any importance.

As mining and insurance companies are local in their nature, we shall not consider whether they are justly taxed or not. Not so with railroad companies. They traverse our State in every direction. State authorities tell us that there are but eight counties in the lower, and one in the upper peninsula that do not have railroad connections. The same authorities tell us that nearly every city and village of any importance, in the southern part of the State, have one, and many of them two or more railroad outlets. You must readily see that their interests are identical with the interest of the whole State, and not with any particular locality.

I shall not consider whether the specific tax on railroads is too high or too low. I presume the rate of taxation was fixed away back, years ago, perhaps at a time when the land before mentioned was taxed at twelve cents per acre. The tax on our land has increased nearly three times since then. How is it with the railroads? They pay the same tax now that they did years ago. Would it not have been a lucky hit for the farmer if he could have had his rate of taxation permanently fixed years ago, when the rates were lower than they are at the present time. I would have every mile of railroad taxed in the county where it is located, and I would have them pay the same taxes that any other class of property pays, in proportion to the valuation of their property. When taxes were high they should join in the burden. When taxes were low they should have the benefit of a low rate, the same as other property.

There would be less cause of complaint in regard to the question of taxation, if every class of property was justly assessed, and paid its equal proportion of the taxes required to maintain the present high standing of our government.

Having occupied your time so long with direct taxation I shall necessarily

have to be brief with the subject of indirect taxation. This I believe to be the main question before the American people to-day. Our wise men whom we have sent as law-makers to our national capital differ upon this subject all the way from free trade to high protection. How then do you expect me to do this subject justice by attaching it to a subject that has perhaps already wearied you. I shall attempt no more than mention a few of the most prominent features of the question, leaving many important points to be brought out in the discussion if the audience so desires.

Webster's definition of indirect taxation is a tax on articles consumed, but not collected immediately from the consumer. This tax is collected under what is known as the tariff laws—a law imposing a tax upon articles imported from a foreign country. This tax is paid by those who buy goods in foreign lands and bring them to our shores, and the amount of the tax is added to the price of the goods as a legitimate part of their cost.

The importer sells to those who wholesale, and they to those who retail, and when imported goods are bought by the consumer, they pay the tax, by paying an amount equal to the tax over and above what the goods would have cost if they had been imported free of duty. Not only imported goods are increased in price by this tax, but home products are also increased. Some to the full extent of the tax, some by a portion of the tax, and some are not at all increased. Mr. Mill says: A tax on any one article, will as a general rule raise the value of the commodity by at least the amount of the tax. Other writers on political economy say this: When a home product of an article is not equal to the home demand and articles are imported to supply the deficiency, the whole amount of the tax will be added to the price of the home product.

This can be illustrated by the article of sugar. We produce a small portion of the sugar we use, and import the balance. The tax on sugar is on an average, two cents per pound, and the whole amount of the tax is added to the cost of the home product.

Another maxim is this; where home products exceed the home demand, and can be imported at a profit, the imposition of a duty on goods of a like character will not affect the price of the home product. This can be illustrated by the article of breadstuffs. Although there is an import duty on breadstuffs it does not increase the price of the home product a farthing, because we export millions of bushels where we import thousands.

This method of taxation is not looked upon with favor by a large portion of our tax-paying citizens. Writers on political economy have laid down as one of their maxims, that every subject of a country should contribute to the support of the government, in proportion to their respective abilities. Such is not the case under the tariff laws. Each person contributes to the support of the government, *not* in proportion to what he is worth, but in proportion to what he consumes. A man of limited means may pay more for the support of the government than a rich man.

I have heard a great deal said within the last few weeks about taxation. All complain that their taxes are high.

This is in reference to direct taxation. What would people say if they knew they were paying an indirect tax, as large or larger, than their direct tax. One reason we hear so little said about indirect taxation is, because a great many people well informed on most subjects, do not know *when* they pay nor how *much* they pay by indirect taxation. This is not because the

people are ignorant, but it is because it is a subject not easily understood, requiring more time than the average farmer can give, to clear it from its mysteries, and make its workings familiar to the people who pay tax under this law.

About two years ago it became evident to our national law-makers, that they were collecting money under the tariff laws, in excess of the needs of the government. A commission was appointed by Congress, whose duty it was to hold meetings during the adjournment of Congress, and people of all classes and professions could appear before this commission, and advocate a higher or a lower rate of tariff, as they might think best for their interest; and it was the duty of this commission to report to Congress the result of their deliberations, in a bill for a revision of the tariff laws. It was variously estimated by different members of Congress, and other officials, that the revenue might be reduced from seventy to one hundred millions of dollars, with safety to our national finances. The commission reported and their report resulted in our present tariff law. It now appears by the message of President Arthur, that the revenue under the new tariff law will be a reduction of about fifty millions of dollars, and he says he has no doubts that still further reductions may be wisely made.

The report of the secretary of the treasury says that from the actual and estimated receipts and expenditures of the government for the present fiscal year, after placing to the credit of the sinking fund a sum that, if continued each year, will be an amount sufficient to pay our indebtedness as fast as it becomes due, there will remain in the treasury about forty millions of dollars. And his estimates for the year ending June 30, 1885, after crediting the proper amount to the sinking fund, will be sixty millions of dollars.

Why need this large amount be collected? Why not collect just enough? One of the wisest statesmen in the country says: An overflowing treasury always leads to extravagance, to many forms of corruption, and to all manner of schemes for getting rid of money.

But, says one, why not pay our national indebtedness? In answer to that I would say that we have come to that pass in our financial affairs where we will either have to stop paying our bonds or destroy our present system of national currency. However much we may differ in regard to the best system of currency for the country, I presume no one would be in favor of impairing the present system until another and a better one has been created to take its place.

I fully agree with the president when he says "Let the revenue for the next four years equal the expenditures, and all difficulties will disappear." By way of explanation let me say, that I do not agree with the president, who is in favor of increasing the expenditures for the purpose of making receipts and expenditures balance, but rather I am in favor of reducing taxation to the extent that no more money be collected than the needs of the government may require. The president and the secretary of the treasury both recommend a further reduction of taxation under the tariff laws, but the workings of congress are so slow that some time may elapse before any change will be made, but any one who is conversant with the sentiment of the American people, cannot help but see that a lower rate of taxation must come sooner or later. I for one join with those who favor a lower rate of taxation and ask that the reduction be made upon farms, factories, shops, and the necessities of life, and not from whisky and tobacco as some advocate.

How do the tariff laws affect the farmers of Michigan? What has the farmer to sell that is in any way increased in price by reason of the tariff laws? What has the farmer to buy that is increased in price by the tariff laws? These are questions that should be considered by every farmer, and every one ought to be able to decide these questions for himself, after giving the subjects proper consideration. Aside from the single article of wool what have the farmers of the northern states to sell that is in any way increased in price by reason of the tariff laws. There were 120,000 farms in Michigan in the year 1881. Estimating one-half of them to be stocked with sheep, and the average price of wool 30 cents per pound, the average amount received for wool by each farmer would be less than sixty dollars each. Thus you see there could be no very great benefit to the farmers of Michigan from this article alone. What does the farmer buy that is increased in price by the tariff laws? All articles any part of which is made of iron, steel, lead, copper, or nickel; all stoneware, glassware, and earthenware; all manufactured woolen goods; sugar, paints, oils, over 100 kinds of drugs, and a great many other articles unnecessary to mention. Thus you see the farmer cannot buy very many tools used upon the farm, or articles used in the household, without paying out more under this law than any benefit he can receive under the law. I do think a wrong was done to the farmers of this country in reducing the tariff on wool without making a corresponding reduction in the tariff on manufactured woolen goods. Aside from the tax imposed by the tariff laws is another tax, called by some an incidental tax. This is an increase in price upon the home product of an article equal in amount to the tax upon the imported article. This tax is not paid to the government.

This can be illustrated by the article of sugar. The tariff tax is, on an average, two cents per pound on sugar. The increase in price on the home grown product would be called an incidental tax, and is not paid to the government, but to the pro—, I came very near saying the producer. If such was the case it would remove one of the most serious objections to this incidental tax, but it is thought that only a small portion goes to the producer and the lion's share to the refiners and wholesale dealers. And I have no doubt that a like result will be the case with any other industry that is stimulated by this incidental tax, a small part will go to the producer and the larger part to those who handle the goods, between the producer and consumer.

There must be some industry that can bear a reduction in indirect taxation without any detriment to the country. We have the richest copper mines in the world; some of them pay a quarterly dividend of twenty per cent, eighty per cent per annum. Shares of stock, whose par value is \$25.00, sell in the market for \$225 per share. We have the richest iron mines in the world. We have Bessemer steel works that pay a dividend of 22 per cent, and then have a surplus on hand larger than their original capital.

As a general rule when any industrial interest gets rich enough that they turn their attention to making governors, congressmen, supreme judges, and the like, it is a pretty good sign that they no longer need protection. As I have said before, our law makers are ranged along the line, from free trade to high protection. I think a very few want free trade, and a very few want high protection; the majority I think stand on middle ground, and are in favor of raising ample revenue for the needs of the government—no more—no less.

HOUSE AND HOME.

BY MRS. C. H. WINES.

[Read at Chelsea Institute.]

There's many a house without a home within its walls. There's many a home without a house in which to dwell. It is only when the two are combined, that the most perfect end is reached, or greatest happiness realized. Home, like all other institutions, has its external form and internal power. We, ourselves, furnish a good illustration of this. The house the physical; the home the spiritual, or the soul. The house the structure; the home the living, acting force within. For some it is easier to build a house, for others to make a home. In my girlhood days, I had a friend reared by kind, Christian parents, in a home where neither poverty nor riches dwelt; but where love, charity, and honor abode. The lesson of such a home developed a beautiful character. She became an obedient, loving daughter; an affectionate, patient wife; a tender, faithful, Christian mother. Five children were hers, to care for and rear for eternity, when, by a long train of adverse circumstances, and the unfaithfulness of her companion, she was reduced to poverty. In fancy, I see now the sweetness and smile upon her face, as she told me of the time spent in prayer for reconciliation and wisdom, to enable her to make a home, a pleasant home, in a shanty standing in a mill-yard, with no fence to tell the passer-by where dooryard ended, or millyard began. Even lumbermen did not know their limits, but if more convenient, at times adorned the front yard with their merchandise. So small was the house that she went across the street to a friend and asked for a small room that she neatly furnished for her two oldest daughters' sleeping-room; for in poverty she must never lose sight of the fact that they must be respected, they must be refined. When she had done all in her power for the external part, and found it far, very far below what she had been wont to possess and enjoy as her own, instead of repining, she set herself to work with great zeal to counteract the loss the external part suffered, by a richness and fullness of the spirit within. Nowhere could a better example be found of patience or forbearance; pardoning and pitying coarseness in others, yet never indulging in it herself; covering, with Christian charity, the sins of many, yet always maintaining for her own family a high standard. By some secret power of love, she attracted those who were far above her in this world's goods, and in her plain garments never seemed out of place in their circle; for the glow on her cheek, and the benevolence of her heart, seemed to ray forth, and to diffuse over them a pleasureable sense, like that of a soft, bright day. The influence of this home developed truthfulness and worth in her children. No memory is more dear to them than the faith of their mother in that humble home.

I know a home, no, it is only a house, built in a beautiful city, with all the splendor that would seem at all necessary for comfort, pleasure, and happiness. One year was spent in planning, devising, procuring, and anticipating. It did not lack the beauty which architect could devise. Into its cosy rooms was brought an abundance of all the necessary comforts. It did not miss the adornment that costly furnishing goods could afford. The richness and beauty which art could give were supplied. Many a passer-by exclaimed, "What a pleasant home!" But it was only the physical part; it was only

a structure reared. The living, acting, feeling, or enjoying part was still to be supplied. The inmates came. In honor they were not stern and chaste. In forbearance they were not disciplined. Christian charity they knew not. They were not faithful in love. Impatience manifested itself at the slightest occasion; indeed, she seemed to sway the sceptre, and they became her willing subjects. Words unkind, often severe, resounded from those beautiful walls. Unrest, unquiet, everything foreign to a loving, peaceful, home entered there, and was nourished and cherished until love was turned to hatred, and they went out and left the beautiful house, because no home was there. Could gold have bought it, it would have been purchased at a great price and borne to the rich mansion and prized above all other treasures. But alas, they knew not how to obtain it. They knew not, if only both would stretch forth the hand, and lay hold of what was within their grasp, and bring in the spirit of forbearance, sympathy, and love, it would have been to them the choicest spot on earth, a haven of rest, a harbor affording protection from the storm, strife, and turmoil of outer life.

From the above illustrations, we find that home is not all there is of home. Happy is he or she who understands this, and when the home is built is able to furnish it with just what will accord to them the comforts and delights of a genuine home. Could these be catalogued, and all we had to do was to select, order, and pay bills, the amount of social happiness would be greatly augmented. Could there be rules given that would bring us direct to this coveted goal, how many an anxious student would be found pouring over them, full of hope and bright anticipations? Are we then left as a mariner without a compass, driven hither and thither, without any knowledge of our bearings; counting ourselves lucky if we reach the haven, and it as only one of the incidents of life, if we are left to be tossed about as long as we live? Ah! no, the good Father knew and cared for this want in our nature. His golden rule, his oft repeated instructions to love one another, to bear with one another, will cover the entire ground. But as many a student in mathematics will read again and again a rule, and yet with befogged mind, fail to know how to apply it to bring the desired result, so we read these blessed precepts over and over. We listen to our pastor's beautiful lessons drawn therefrom, we hear them demonstrated, see them illustrated, and yet do not allow them to control our lives, our acts, our homes.

Again, we repeat, the first great quality of a perfect home, is the love the inmates bear each other. If it is found in father and mother, it is sure to exist in brother and sister. A circle whose members are all engaged in the interchange of the offices of love, cannot be an unhappy one. I remember a professor telling his class in mental philosophy, that it is a law of our being that those to whom we show kindness we learn to love, and those whom we injure, we learn to hate. Is not this then, the strongest argument for acts of kindness, daily and constantly in the family circle? If each tries to be unselfish it will be an easy matter. Study to know what will produce happiness; what will produce misery. Indulge the one and avoid the other.

I have no sympathy with the many articles found in our papers, which make almost the entire weal or woe of a household depend upon the wife. The care of the house is her especial province; not so the happiness of the home. It is true, very much of the latter depends upon the former. A house in disorder would be but a poor place for social enjoyment and culture. A house untidily kept is a poor aid to cultivation of manner and personal appearance. A house poorly supplied with daily food will not best tend to evenness

of temper and amiable spirits. A house whose avenues of daily expenses are not well guarded, will not be apt to furnish means for occasional luxuries. And as all beauty acts with a moral influence upon our hearts, so I say, a house with naked walls and destitute of the many little simple, bright adornings, which so enliven and cheer our hearts, is not the best home in which to feed our moral natures. A few days since I visited in a home made so pretty by the skill and taste of the young wife, that I felt it would be wrong not to show my appreciation of her effort. I said (I presume with a good degree of enthusiasm): "I think your house is so pretty, so bright, so cheery." I watched for a moment the blush on her cheek, and then came the reply that pleased me above all others: "That's just what Charlie says. He says the moment he opens the door, it seems so bright and cheerful." Who can say what may be the influence of such a home over a man with any appreciative faculty in his nature? Had he seen the ornaments, one by one, he would have thought them of no worth, but by skillfully arranging, by properly blending the colors, by brightening up dark corners, by filling in the waste places, the house was made beautiful, and the home became lovely, the inmates happy.

Think not that happiness is a property that exists in the ornaments. What will produce joy in one household, may not in another. Study to know the tastes of your husband. Learn the wishes of your own wife. Inquire after the pleasures of your own son. Purchase the delights of your own daughter. Rest content, nay, not so, but count yourself happy, if you can by any means bring joy into your own home. Think carefully before you say to a friend, I would not indulge my husband in this; or I would not do that for my wife. You know not what you may be doing. What costs you one dollar, may cost your neighbor one dollar and much unhappiness therewith. Prescribe for another in buying and selling stock. Let another advise with you in matters of loss and gain, but you alone must best understand how to make your own home. Make it a place where Contentment sits enthroned, where a welcome ever awaits you; whose warmth and love robs all vexation of its anger, takes all weight from annoyances, and redeems you from care. In darkness and trouble it will lead you away, to taste the fullness of joy which the good inherit. It will strengthen your every virtue. And then, when you have this almost perfect home, over against you is set an enemy, the destroyer Death, whose shafts, sooner or later, will surely be sent to gather its inmates to that perfect home, in the beautiful house of Our Father, which has many mansions.

RELATION OF THE FARMER TO THE DISTRICT SCHOOL.

BY MRS. W. T. ADAMS.

[Read at Grand Rapids Institute.]

MR. PRESIDENT, LADIES AND GENTLEMEN,—I have tried in vain till the last week to think of something to say on the subject chosen for me. I have repeatedly asked myself, why did your committee want *me* to write anything on this subject when there were teachers from our Agricultural College and the learned men and women who might have been chosen from our city and vicinity? Till I could solve this problem it was of no use for me to try to write. This morning when washing the lamp chimneys the answer came to

me like an inspiration. I thought of the student who showed his lamp chimney to a certain college professor and asked why there was always a dark streak around the center? The professor gave a philosophical explanation, but the student told him it was because his finger was not long enough to reach any farther. I thought the institute did not want a scientific answer, but simply a woman's idea, so I will tell what I know about "The Farmers' Relations to the District School." Usually the school is but a haphazard relation of all the farmers in the district except the school officers. The honors or emoluments of a district school officer are not so great that, in a struggle to secure them, they should cause any unpleasantness in the neighborhood. We are all interested in having prosperous schools, and to promote the public good should be the chief aim of the school officers. The relationship is not always all it should be. Sometimes the board select the text books to be used; they provide a school house furnished. When *sumptuously* furnished they are provided with a dictionary, besides the desk, chair, stove, water pail, and dipper, which are found in all school-houses. After satisfying themselves that there is plenty of fuel, and that the broken window panes are replaced by whole ones, they rest in self-complacency, thinking their duty is well done, and that their relationship to the district school is at an end, to be reestablished only when an order is to be drawn on the assessor. The parents should occasionally visit the school and by their presence encourage both teacher and pupils, thus showing that they feel an interest in their progress in learning. If, when visiting a school, you see the teacher look up over his glasses at some of the mischievous lads and he should happen to say, "Boys, I'm a watchin' on ye," you will find that there is a defect somewhere, and as if you did not wish to own any relationship. It is of the greatest importance to have careful, conscientious teachers that the children under their care may receive the proper training, both by precept and example. The moral discipline that should be commenced in the home should be continued and enforced by the teacher; eradicate all false ideas from the head and heart; if the *child* can learn the principles of justice, the *man* will practice them; the school cannot teach religion, but it *can* teach purity and honesty.

As fifty-seven per cent of the population of the United States are engaged in agricultural pursuits it is necessary that this class should receive good educational advantages that civilization may make continued advancement. By law it is the duty of parents to send children between the ages of eight and fourteen years to a public school for at least twelve weeks in each year, but as parents in general want their children to become educated, they do not have to be compelled to send them to school. It is injudicious to have a child who is slow to learn take history till a habit of study is formed; if undertaken before the mind can comprehend it it will be difficult to overcome their aversion to it. The same may be said of grammar and some other studies. Where the child has a natural taste for any particular study it can be commenced earlier than a branch for which they have no liking. On any occasion when extra help is needed at home the children must, of course, stay out to help, as such an interruption in their studies would stimulate them in their efforts to be smart, and learn in one day what the others had learned in their absence; and it would serve as a means of discipline to the teacher in learning patience to bear other ills of life as they may overtake her; then in after years, should she ever be called upon to write an essay for a farmers' institute, she may be able to bear the interruptions and overcome the obstacles that are in her way, and remain "Calm and unruffled as the summer sea." The world is a school

in which we all learn life's lessons; our first commences before we are old enough to enter the school room, our last closes only when we lay life's burdens down. We receive our preparatory course in the district or graded school, seminary or college as the case may be, according to our location, and according to what our life work is to be. I would be glad if every farmer's son and daughter could have a thorough collegiate education, especially if they intend to make farming their profession. All have not the taste or inclination to go through college. Some who would be glad of a higher education, from force of circumstances, can not avail themselves of the advantages to be gained by it, but by a judicious use of the odd moments can gather up a fund of useful knowledge.

Many of our ablest men acquired their early education at the district school, and in some instances their advantages were very meager, often with the privilege of only a few months, in winter, in the district school. Their school houses were rude buildings, scatteringly placed over the country; their books were few and often their teachers were self-taught, but they, by the discipline received in acquiring knowledge, could better sympathize with and teach those who were under their care and instruction.

If by a practical use of knowledge, the fertility of the soil could be increased so that farming would be as remunerative as other professions, we would not hear so many remarks about book-farming. An old man who was a little daft was in the habit of cutting pictures out of newspapers and calling them money. In reply to the lady's question whether they would pass for money, he said: "Put a little silver with them, and they go first-rate." If the farmer will put common-sense with his book-learning, it will have the same effect the silver did on the pictures. There are none who so much need common-sense, or need so much of it, as the farmers; they, of all people, should be highly educated for they are, of necessity, much alone, many times without society only what is around their own fireside. If the farmer and his sons have nothing to think of above the work in their hands, or his wife and daughters no thought only of the drudgery of housework and the endless routine of getting breakfast, dinner, and supper three hundred and sixty-five days in a year, labor loses some of the "dignity" that many can see in it; if uneducated, they can never escape ignorant company, but, with a cultivated taste, they can take some book of travel and make a tour of the world with the author for a companion, and enjoy the society of the learned in the old world or the new.

Farmers of to-day are not the isolated class they were fifteen years ago, unless they remain so from choice. We have the Grange now where we may meet and friend hold fellowship with friend. Those who are within the gates know its educational and social privileges, but all who meet their members must feel the refining influence it has exerted over the farmers and their families.

The physical education should not be neglected; there is usually abundant opportunity for full development on the farm without joining a college regatta to insure it. Farmers' children are full of human nature, and in this respect are much like the rest of humanity. I have not spoken of the financial relation existing between the farmer and the school, which is sometimes *dearer* than all others, and may prove to be *seriously* dear if we have a few seasons like the past one. If I thought it allowable to speak about our system of taxation I would not feel justified in saying aught against it till I was prepared to offer a better one. As taxation has seemed to be the most difficult subject of

legislation for the men, it may be the better part of valor for women to keep silence with regard to it; but they will wonder sometimes why a Paris farmer should pay nearly as much in school tax as a Wyoming farmer pays in school, town, county, and State tax combined, when the farms of each contain the same number of acres, and the personal property is about equal. Johnson says, "We cease to wonder at what we understand." So will some one explain why the relationship is varied in a fractional district according to the township in which the farmer may happen to live.

If you deem my remarks rambling or washy I will say, by way of excuse, I have not had time to gather them together and boil them down, and if I have failed in my efforts in presenting this subject to you to your satisfaction, please remember that life is made up of disappointments, and count this as one of them.

DISCUSSION.

Mrs. A. V. Weatherwax led the discussion which followed. In speaking of the expenses of maintaining the district school she said: When we think that our schools form the intelligence of the common classes, the school taxes are nothing. Three dollars and twenty-five cents per capita is not extravagant. The relation of the district school to the pupil is like father to son. America owes the patriotism of her citizens to the schools. Never take the word of a teacher regarding a pupil, but go and see for yourself. People should visit their schools oftener. Farmers should, at least, take as much interest in the schools as they do in the stock yards. If the teacher has a hobby, make a change and get a teacher as near perfection as possible.

Cleanliness is too often neglected in district schools. A dirty school-house has a bad effect on the scholars; it promotes slovenly habits and carelessness in dress.

Another defect is the parents' ambition to have their children study higher branches when the teacher is incompetent to teach them, or to urge pupils into studies that are far beyond their reach. I have seen children from eight to eleven years old, who could not even read, studying grammar and geography.

As for temperance. There is not a school in Michigan but what ought to have temperance principles taught as much as the English branches. To get rid of an evil commence at the root.

Dr. Kedzie said the difficulty in the common schools is that we teach too many branches, and not enough of each. We don't go to the bottom. Make the studies fewer and learn them thoroughly.

THE FARMER IN SOCIETY.

BY MRS. A. M. WOODRUFF.

[Read at Berrien Institute.]

There has been, and is now to a certain extent, an idea prevalent with farmers that in order to be independent, they must pay no attention whatever to the forms of social etiquette, to give no thought to the clothes they wear, or the manner in which they wear them. There is a small foundation for these opinions. When we consider the silly, frivolous, foppish airs practiced by some persons living in cities and villages, we do not wonder the sound, sensible

mind turns a deaf ear to any thing which tends in that direction. Yet there are manners and customs belonging to good society which make it our duty to inform ourselves, so as to become agreeable to those with whom we associate. In looking over the history of society in the last century, it appears to be divided into four classes—aristocracy of intellect, aristocracy of wealth, the middle class, and the farmer; in all cases placing the farmer at the bottom of the social scale. Let us consider for a moment the cause.

We are told, in order to take a good position in society, we must have respect for the thoughts and feelings of others, to be welcomed by cultured people we must seek to improve those faculties of the mind which will lead us to higher thoughts and nobler purposes. The world moves, and in order to progress we must not expect to jog along in a stage coach in these days of fast express trains. Manners and customs which were suitable one hundred years ago are hardly acceptable at the present time. Many a mind with golden thoughts is so shabbily clothed it fails to be appreciated. Of course we must have the thoughts to clothe or the clothing avails us nothing. A minister of the gospel whose whole appearance is slovenly, fails to flash the truth into the hearts of his hearers. The merchant who shows his independence by keeping articles which *he* thinks people ought to purchase, soon learns his customers go where their wishes are respected.

The first indispensable requisite for good society is education. This the average farmer has neglected. The farmer has more time for mental improvement than any other class of laboring men (we would not advance the idea the learned professor is not a laboring man, for his duties are arduous and his labors great). He is sure of the long winter evenings, and if he has the taste, energy, or ability to improve them by acquiring useful knowledge, he will rise above mediocrity. We must come to this conclusion. If we are at the bottom of the social scale, we may well say in the words of Cassius: "The fault, dear Brutus, is not in our stars, but ourselves that we are underlings." The farmer whose whole mind is centered upon making money, owning all the land within his reach; who rules his family with a rod of iron, who is not willing his children should have any social advantages, who looks upon visiting as a waste of time, finds as he nears the boundary of life, he has failed to reap that fruitage which is not only a pleasure to his friends, but a comfort to himself. One thing we can look back to with pleasure. Many of our great and good statesmen came from the farm. But read their biographies, and we see the desire to rise in the world while they are quite young. They rise in the minds of their associates. There is a social magnetism about them which makes them leaders while in youth. If our boys and girls will read carefully the lives of Washington, Benjamin Franklin, President Edwards, and our illustrious Garfield, they will see how careful these noble men were in the cultivation of every positive virtue, in the weeding out from their characters of every vice and frailty; how they loved excellence, and how hard they strove to attain it, and that it was by no accident that they became men of mighty and long-enduring influence.

The position of woman is that which has always given the key to civilization. The mothers of the men of the nation were noble women, the language of their prayers being, "I ask not for my children riches or worldly honors or fame; but I ask that they may be subjects of Thy converting grace," the result being men of power. If the mother is true and tender, loving and heroic, patient and self-devoted, she consciously and unconsciously organizes and puts in operation a set of influences that do more to mold the destiny

of the nation than any man, uncrowned by power of eloquence, can possibly effect. There is no other possible way in which the women of the nation can organize their influence and power that will tell so beneficially upon society and the State. We must give to all kindly courtesy for we know not their sore need; but above everything we must be courteous to those who are in our own homes. Gentle manners must be taught like music. If a girl waits until she is quite advanced in age before touching the organ or piano, it will take much practice to play passably, while if she tip-toes up to the piano and strikes the keys as soon as she can stand alone, she will grow up, other things being equal, its mistress. If we would have young people become familiar with the habits of good society we must begin with them early, and teach them by example as well as dictation.

Social intercourse is in fact the consequence of a necessity felt by men and women for new channels of thought and new impulses of feeling.

We read books for the very same purpose. And as it is impossible even for the most dissimilar persons to be near each other, to be daily seen and brought into contact in the business of life without insensibly producing deep impressions and working changes of feeling and character not easily removed, the books we choose as companions leave deep impressions upon our natures.

Our mind was forcibly impressed with the above thought from reading a short article in the *Inter-Ocean* entitled "What do your boys read?" Four boys in Milwaukee were arrested upon numerous charges of incendiarism, which revealed the fact that they had a pirate's den; kept on hand a large supply of cigarettes, chewing tobacco, etc., and swore in members with a cast iron oath. It was reported that these boys were members of respectable families, regularly attended the public schools, and were in good standing in their classes, but were instructed in such depravity by vicious literature. One called himself "Peck's Bad Boy," another had a "Cowboy story" on his person. The father and mother in these days who, when there are floods of good books and magazines of the most beautiful and interesting character for the young, permit vicious and pernicious publications in the home, incur a fearful responsibility; are treading on very dangerous ground, "sowing the wind only to reap the whirlwind."

A few farmers have made for themselves a position in society, and they deserve much credit for perseverance and energy, as they had not the social advantages their friends in the city possessed. The young farmer who does not seek to rise in the social scale will, in the far busy future, look back to these golden opportunities and regret that he did not grasp them. Knowledge, that pearl of great price, is given to those only who prefer it to ignorance, and we can make it truly and usefully our own by appropriate application.

LIFE ON THE FARM.

BY D. M. ORR.

[Read at Caro Institute.]

MR. CHAIRMAN:—Life on the farm may be one of the happiest conditions a man can be placed in here on this mundane sphere, or it may be one of the most miserable—he may live, simply live.

“ This world is not so bad a world
As some would like to make it,
Whether good or whether bad,
Depends on how you take it.”

Very many drag out an existence of self-imposed slavery, little less than the serfdom of some of the European countries. The facts are too many farmers try to do too much. The making of money, the accumulation of wealth, seems to absorb every other interest; and this applies to the farmer with as great force as to any other class of men. Although his condition might be very much bettered, he seems to think that he is doing about as well he can, not having ever known what the possibilities of a farm life are. It is work, work, all the time from early morning until night, year after year, when he finds himself an old man in the prime of years. At thirty-five he is as old in appearance as he ought to be at sixty. He then stops in his career for money, and asks himself these questions, Why am I ruined in health? How is it that this terrible life struggle, those sleepless nights, with all this hurry and worry, have brought me only misery and premature old age? My accumulations have sapped my very vitals without giving that imaginary something for which I have been so arduously striving. Is this the normal condition of the race? Is this all there is of earth life? I am told, and I believe it, that this life is preparatory to the happiness of the next, and does that preparation simply consist in hard work all the week, and perhaps attending church on Sunday, going home without knowing anything about the subject of the sermon, having been asleep during the service? No, this is not that preparation spoken of. This is all wrong; no man or woman should work so hard as to exhaust themselves to the extent of being unable to keep awake; for such prostration induces disease and calls for stimulating drinks, either of which brings on old age and premature decay. Nothing, unless it be rest and sleep, will restore the system to its normal condition. But every such depression of the vital forces brings more gray hairs each time, and renders recuperation more difficult. The over-worked man, the tired man, is in a comatose condition; whatever he does, he does mechanically, not knowing hardly how or why he does it. This condition of things destroys all desire for literary attainments of every kind; and the farmer comes to believe that literature and a knowledge of the sciences belong to a class of men with more brains, better opportunities, and more time than they have; and thus they pass through life more miserable, more unhappy, because unsatisfied than almost any other class of men with whom I am acquainted. He dies without ever having known what true joys of farm life are. No man has any moral right to so use himself that he cannot discharge those moral and civil obligations he owes himself, his family, and his fellow men. His creation demands of him a proper development of his physical, together with the highest possible attainment of the mental, that he may transmit this unimpaired to his offspring, is a demand that that offspring has to make. That these conditions are kept inviolate is a necessity that society has a right to enforce.

Such a state of things renders him incapable of defending his own interests, in case it becomes necessary. As a proof of this, we have only to look at his transactions with the middle-men, who infest our land, and of whom the farmers are continually complaining. It is true, they make their money out of the farmer. He is the dupe of all classes of business; but there is no one to blame but himself. He will take little or no pains to protect himself in his business, as nearly every other business does. They have so little confidence in one another, that they dare not trust their interests in the hands of

an agent appointed by themselves. Granges have been organized in many places, and I understand some of them have paid well, especially in the older portion of the State. Those, however, that were at one time running in Tuscola county, have either gone down, or exist only in name, all for want of confidence, and a knowledge of its true interests. The result is that he has to feed and clothe the world, without receiving enough to pay him but a very small profit for his produce. Whatever is bought, is on credit; his debts accumulate, until his anxiety becomes akin to misery. Under such circumstances, it is impossible for him to be cheerful, happy, or even social. He feels that he is going down hill becomes discouraged, neglects his business, or makes another venture, which may either help him out, or get him further down. This haphazard way of doing things, is the way too many of our farmers go to work; then they call it luck, good or bad, depending on how the venture turns out. We see this more particularly in the purchase and handling of thoroughbred stock by men who are novices in the business. They conclude to purchase a particular kind of cattle, because they are popular; others have succeeded, and why cannot they? He goes to some one who advertises their stock, and not being posted, is no great judge, and the individual who has the animals to sell, praises their good qualities, but never mentions their poor ones, for very few breeders will sell their best animals. The result is he has bought this man's culls. Now, they possess all the defects of the breed. When he comes to breed from them, he may get now and then a fine representative of the race, but the chances of success are against him, and he makes up his mind that raising high priced cattle don't pay.

He now concludes, after having found on the wrong side of the balance sheet several hundred dollars, to try a wheat crop. He goes to work, and fits his ground and puts in his crop; he never, or seldom knows what it has cost him; it comes up in due time, has a good color, and he begins to think that he has struck oil. And at harvest time he feels that thirty bushels per acre isn't too large. He cuts it, puts it into the barn, and threshes it; he takes it to the market and gets ninety-three cents per bushel for it, he goes home, pays his help, and borrows the money to pay his thresh bill. He now thinks the fates are against him, and so they are and always will be until he makes up his mind to become acquainted with the business he wishes to pursue, and I think the best way would be for them to organize a grange, or some other protection, take some good agricultural paper, buy some work or works treating upon the subject, read up, become posted. Until he does so, he will hardly succeed, for life is too short, and most farmers have too little capital at their command to learn by experimenting alone. He concludes to sell the farm and move into town, and in too many instances a few years finds them without a dollar, discouraged, and but a wreck of his former self. During this time the wife and mother has acted a very important part; she has worked and made a slave of herself, until broken down in health, and she too is but a wreck, while comparatively young in years. She has worked for her girls while they were reading some popular novel, or examining the latest fashion plate. She has wept, and prayed for her boys, who left their homes before the farm was given up, some of whom are in the far west, while the whereabouts of the others are unknown.

This dear, good mother thinks it is her duty to do all the work and wait upon her darlings, that they may have time to read and store their minds with knowledge. Indeed, if it was useful knowledge then that good mother would not have worked in vain, for I believe it to be man's highest duty to acquire

all the knowledge he possibly can, not only for the happiness and joy it affords him here, but for the additional reason that he starts out again right where he leaves off. If there is one evil which is a great deal worse than another it is this light reading, this fictitious literature; it is a deadly poison to any young mind. Notwithstanding, we find in most families and circulating libraries that the majority of the books are of this class. This is because of a perverted taste in the one case, and because their books are more eagerly sought after in the other. Both are doing their work much faster than all the doctors of divinity can undo, and the seeds of mental disease are being sown broadcast all over the land. Let fathers and mothers look to it that their children are supplied with good, healthy literature. Boys and girls will be satisfied with life on the farm providing they are allowed those things a well directed fancy indicates. Let fathers understand that strong desires in his boys disappointed at home will seek them elsewhere, and the chances are that bad associations will cause an intemperate indulgence in those pastimes and recreations that would otherwise have been harmless; not only so, but beneficial.

Let not this too much, my friends,
Disturb thy honest breast;
This partial view of human kind,
Is surely not the best.

The dark side of life belongs to those who are continually making mistakes without ever profiting by them, blue and sour with never a smile or kind word. There are many things that perplex the farmer, and mar his happiness, most of which can be remedied by becoming acquainted with the true condition of life, for every human being is endowed with that which will render him happy; the only difficulty is to know how to use it after he has developed it. Everything we find implanted in the breast of man, we believe to be right because an All-wise Being placed it there. And for every desire, he has created a corresponding something to gratify that desire. Now, the thing for man to do is to learn how to make a temperate use of those gratifications. To do this, and bring them into farm life, renders the farm one of the most desirable places on earth. It brings wisdom, charity, and love into the household, and makes home a little Heaven. Farm life is the natural condition of the race. "Dust thou art, and unto dust shalt thou return," was spoken by God, of man, showing his relations to earth to be natural. The tiller of the soil has a right, and ought to be, the wisest, the most charitable, happiest, and noblest of his race. For his associations are of such a character, and his surroundings of such a nature that he is brought in continuous contact with the elements of human happiness. The richest store-house for the intellect is there, geology, botany, chemistry, and entomology, these afford a rich harvest for thought and study; these the children can be taught and be brought in contact with Nature's laws, thereby creating in them a love for something substantial and good. So employ their time that none will become disgusted with the labor in hand; Give them an opportunity to gratify their desire for recreations. Furnish those recreations yourself rather than to trust to a stranger in after years. Keep their confidence and they will come to believe that home is the most lovely spot on earth. At the base of the prosperity of any people, and especially that of ours, lies this great principle: *Make labor fashionable at home* by means of the powerful influences of early home education. Endeavor to invest practical labor with an interest that will cheer the heart of each member of the family, and thereby you will give to your household the grace,

peace, refinement, and attraction which God designed a home should possess. The truth is we must talk more, think more, work more, and act more in reference to the question relating to home on the farm. The training and improving of the physical, intellectual, social, and moral powers and sentiments of the youth of our country require something more than the school-house, academy, college, and university.

The young mind should receive judicious training in the field, in the garden, in the barn, in the parlor, in the kitchen; in a word, around the hearthstone, on the farm. Whatever intellectual attainments the son may have acquired, he is unfit to go forth into society if he has not had thrown around him the genial and purifying influences of parents, sisters, brothers, and the man-saving influence of the family government. The nation must always look for virtue, wisdom, and strength to the education that controls and shapes the home policy of the family circle. There can be no love of country where there is no love of home. Patriotism, true and genuine, the only kind worthy of a name, derives its mighty strength from fountains that gush out around the hearthstone, and those who forget to cherish the household interests, will soon learn to look with indifference upon the interests of their common country.

Then ornament your homes with intelligence, goodness, and loveliness. Surround them with lawns, trees, and flowers; it costs but very little, none are too poor to have these lovely surroundings. A home so furnished will not willingly be abandoned, and will be left, when the inevitable time for parting comes, with regret, and with an unquenchable desire to return and renew old and pleasing associations, and where such a love of the beautiful prevails, it is likely to pervade all the business of the farm; fence corners will be cleared of noxious weeds, dead trees and leafless branches will not cumber the orchard, barn yards will not reek with filth, barns and sheds will not exhibit great gaps through which the wintry winds, with keen tooth, may bite the shivering stock, but general love of order will show itself in thrift and comfort. On such a farm, at least, there will be no question but that farming pays, besides being a place of love and happiness. I deny that the tiller of the soil is by nature intellectually inferior to any other class of men; they are just as capable of becoming acquainted with the sciences, which pertain to agriculture, and more susceptible of natural influences than their more sturdy neighbors.

So take courage, my farmer friends, and organize for the defense of your interests, fill your libraries with useful books, and agricultural papers. Study them during the long winter evenings, and at other times, though you have to take two or three hours from your business, you will be the better and wiser for it. You are then not only fitted for the dignity of the farm, but you are capable of filling any position in the gift of the people. Educate your girls, bring them up to habits of industry, give them a reasonable time for rest and recreation, remembering that on them depends the welfare of our country, for they are to be its future mothers. Horseback riding is one of the finest recreations for girls in the world; it strengthens and invigorates the physical, it exhilarates and tones the mental. Croquet, archery, lawn-tennis, and all harmless out-door games should be furnished for them. Nothing will do them more good than out-of-door exercise during the summer months, and in the winter in-door games, together with healthy literature should pass the long winter evenings away. Let boys whose parents are poor, or who have no parents at all, remember that recognition and success does not depend on

wealthy or influential friends. Many men who have been obscure in their origin and birth have been great and glorious in death. In reading the lives of eminent men who have greatly distinguished themselves, we find that nine out of every ten passed their youth and early manhood in fierce battles with poverty, privations, and hardships. This early drill has given them self-reliance. Thrown on their own resources they learn to shift for themselves. Pythagoras said, "ability and necessity dwell near each other." Ben. Johnson followed his avocation with a trowel in his hand and a book in his pocket. Hugh Miller, the great geologist, was a poor stone-cutter. Benj. Franklin, the philosopher, was a poor printer boy. Demosthenes was the son of a cutter, Homer was the son of a small farmer. Abraham Lincoln was a poor rail-splitter, and General Grant, a tanner and an ox driver. Many, very many more poor boys have, by courage, integrity, and perseverance, started at the lowest round and climbed high the ladder of usefulness and fame. "Some succeed by great talent," some by high connections, some by muscle, but the greatest majority by starting in life without a shilling.

FARM ECONOMY.

BY PROFESSOR SAMUEL JOHNSON.

Our English word economy is derived from the Greek words *oikos*—a house, and *nomos*—a law or rule. Primarily, it means the law of the house; the regulation and management of the family. But use has given this, as well as numberless words in our language, a far wider scope and signification. As applied to the farm, it means a discrete, a wise application of capital, of labor, of the implements of labor, so that everything shall be used to the best advantage, without waste, and so that the expenditure of work, in any direction, shall fairly promise the largest recompense in the products of the land, the development of the worker, and the permanent improvement and beautifying of a home.

ECONOMY IS NOT PARSIMONY.

Economy plans, labors, scatters abroad with such wisdom and system that the things desirable are increased, while parsimony withholds in such a way as tends to penury. Without proper, rigid economy in all the operations of the farm (and you will please bear in mind my distinction between parsimony and economy) there cannot be success. As the farmer is rightly economical, so are the balances on the right side of his ledger. In no other avocation is there more need of a systematic, thorough application of sound, economical principles, than in the varied labors of the farm.

Farm economy, then, embraces the right use of labor, time, capital, that each of these factors may be so utilized as to produce the most favorable returns. The operations of the farm are so multiplied in extent, so diverse in character, and the results so contingent upon natural phenomena, upon which we cannot depend with absolute certainty, as to make the solution of the problem how we can best economize in our labors and plans, exceedingly difficult. Neither is it easy to lay down general principles, or rules, that shall be of

practical value, in each and all of the departments of farming, and to which we may adhere with a tolerable certainty of securing desired ends. We can only hope to direct your thoughts to what seems to us very grave errors in farm management, and to suggest some few fixed rules, that experience and observation commend as always safe to follow.

Our subject at the outset, suggests the idea of a plan of operations—a systematic adjustment of time and labor to this plan. There can be no true economy in the absence of such plan and system, in farm management. And yet this law is more widely “honored in the breach than in the observance,” by many farmers. Fields are sown and planted, manure applied, crops are grown and harvested, with no thought as to the effect of such management on subsequent crops. And so the farmer, in his eagerness to secure a quick and bounteous return for his labor, often robs his fields of such elements as make future returns very meager and unsatisfactory.

Buckle, in his history of civilization in England, in speaking of the influence of physical laws, says: “Progress can only depend on two circumstances—first, *on the energy and regularity* with which labor is conducted; and secondly, on the return made to the labor by the bounty of nature.” A plan of work, embracing the rotation of field crops, the proper amount of stock to keep, the breeds most desirable, the arranging of labor for each season, assigning the same, a system of permanent improvements, useful and also ornamental—all these in division and detail form a sort of effective groundwork for judicious, economical management. We need not enter upon the details of a plan, for this must vary with climate, soil, market, cost of labor, etc., but a plan determined upon after careful thought, and amended as changes are suggested in practice, will aid greatly in lessening expenses, in improving the condition of the soil, and increasing products and profits. Without some general plan of management, the farmer will frequently find his work in almost inextricable confusion. Valuable time will be lost, labor misdirected and wasted, and a shiftless, thriftless husbandry be the inevitable result. Men who manage in this way always complain of hard times, and look with longing eyes for some escape from what seems like bondage. “The fault, oh, Brutus, is not in our stars, but in ourselves.” The expense of carrying on farm operations, is greatly lessened if work can be attended to in the proper season.

For instance, we have planted a field to corn, which has come up nicely, so that we have a good stand. If we can commence cultivating before the weeds start, and thus take time by the forelock, we shall thereby make a great saving of time and labor; but suppose for lack of proper management we give the weeds and grass a start of three weeks, and then commence our cultivation, we shall find our work has doubled, perhaps trebled, and do the best we can, the loss cannot be made up. Economy of time and labor demands that we be in readiness to commence our work when it needs attention, unless unforeseen contingencies prevent. It is economy on the farm to do what needs doing promptly, thoroughly, and in its due season. Here is a great leak in the management of many farms, and while oftentimes it seems trifling, yet in the aggregate it comes to the point that divides the profit and loss line. It is man’s weakness to pronounce some things little, because they appear little to him; but “nothing is little, because nothing in the universe exists segregated from everything else,” and to succeed every where we must give the little things close attention, careful study.

With work all planned in advance, help provided and properly assigned, the

prudent farmer has taken time by the forelock. The season may be wet or dry, favorable for this crop, unfavorable for that. Climatic influences may oblige him to modify his plans in some of the details; but he will not find it difficult to do this, or at least he can change his plans to suit changed conditions without great loss. And his work goes on without jar or friction. Self-reliant and independent, he drives his work. Thought and economical adjustment of time and labor make him master of the situation. How different from him who blunders along in a hap-hazard way, always tormented by the thought of labor pressing and demanding attention. A piece of work is begun; but before completion something else demands attention. So everything on the farm soon resolves itself, under such mismanagement, into a condition void of order and comeliness; things drift, and there is disorder, vexation, loss. Everything indicates the absence of competent, economical supervision. Too often these results are attributed to bad luck, unpropitious weather, and indeed everything but the true reason, viz., a lack of economical management.

Again, what is economy in the purchase, care, and use of implements? With the variety of implements for performing almost every conceivable kind of labor which Yankee brains and ingenuity has given us, it is a matter of much moment to the farmer to decide how much and what kinds of machinery he can use to advantage. Machines are made to sell. While all may have some desirable feature, it will not be economy to purchase every machine that is offered, and not every one that promises to be a labor saver. The farmer should graduate his purchases by the amount and kind of his labor, never forgetting that a large outlay for farm machinery will entail more or less of loss in friction and breakage. On a small farm costly machinery may often be hired for much less than the annual interest on its purchase money. The purchase of farm implements evidently will give play for the exercise of sound economy. It will direct us when we purchase to buy the best implements, to be quite sure they will do the work we want done; not because an advertisement or agent, or ten of them say so, but because with our own hands we have managed and our own eyes have seen their perfection of work. Good farmers buy machinery only after fair and thorough trial; and reliable dealers, having good implements, usually sell them in this way. I am not urging this practice to the extent, to which, I regret, some contemptibly mean people resort, of securing a machine on trial to cut their grass or wheat, or to do the sewing of the family for a year, and then return to the uncanny agent with some feigned complaint of its failure.

That the farmer may be rightly economical in his purchases he must keep posted on new machines—improvements to old ones. Only the reading farmer can do this, and so it is safe to say that the well informed farmer is the one whose implements indicate wisdom in selection and purchase.

The economical use of implements demands a moment's consideration. It is not economy to put implements away with parts broken and needing repair, and then in a busy season have to spend a day perhaps in securing fixtures. Economy on the farm enforces this rule, that all breakages are to be repaired at the first opportunity. If a tooth is broken out of a hand rake put it in; don't lay it away thinking, well, I'm through with it for this year. If a casting is broken or worn in the mower, take it to the shop and have it put to rights before it is placed in winter quarters. It pays. Implements are always ready to use when this is the rule. Then keep all cutting tools bright and sharp. Many a boy has become disgusted with gardening, in his first lessons,

because of the dull, rusty hoe that was placed in his hands. It takes time to keep implements bright and sharp; but it is true economy to use time for this purpose. I can well remember when I took my first lessons in mowing on a large farm. The old scythes as they were worn out were placed in a barrel and it was pretty well filled. From this lot of old worn out scythes,—not fit for men to use,—a scythe was selected for me, hung on an old snath, and I was armed and equipped according to custom, if not law, for my outset on the hay field. Too often with such implements the boys are expected to do nearly as much as the men. A small outlay of money may be saved in this way, but it is at the expense of the nerve and stamina of growing boys and is quite apt to rob them of the zest and relish for labor, which a young man feels when he has a good implement with which to do his work.

Discretion in the use of implements is highly necessary. A large part of the breakage of farm machinery is the result of undertaking implements when there are too many obstructions. It is not wise to undertake to cut wheat with a reaper, when the ground is so soft from continued rains that you are in danger of almost miring at every step. Better let the horses rest and use a little elbow grease with a hand cradle. Some farmers and some hired men have such a horror of coming in personal contact with a hand implement that they are always taking great risks of breakage, that they may accomplish everything by machinery. Wisdom suggests a better course. To those who heed, the breakage, the loss, and vexation incident thereto shall be small indeed.

I come now to the care of farm implements, and I need hardly say to you that the evidences of mismanagement and lack of economy are nowhere quite so plainly seen as here, on the majority of farms. Ride through the country and estimate the cost of the expensive machinery you will see in barn yards, in fence corners, by the road side—in every conceivable place except under shelter; subjected to all the vicissitudes of wind and weather, and tell me if there is not a demand for jeremiads over this shiftlessness and waste? It cannot be excused as a necessity. A corner of the barn floor, a cheap shed will give the needed room, and it is quite surprising how many implements can be stored in a small space with a little thought. We can only account for it in this way, that farmers are quite insensible to the loss they sustain by their carelessness, and are content to follow on in the ways of their fathers. True economy demands shelter for all farm implements, and requires them to be placed in proper quarters when not in use. Can I better illustrate this than by giving you an example of the profit and loss of the two plans of caring for implements. Messrs. A and B are neighbors, each owning 160 acres of land. In 1868 each purchased a mower and reaper combined; about the same amount of reaping and mowing on the two farms. Mr. A keeps his mower under shelter when not in use, rarely leaving it out over night. As a result it is looked after carefully and frequently. Nuts are tightened, bolts adjusted, and all kept in the best working order. Mr. B's machine is never under shelter—it is taken to the field and perhaps left there for weeks after the cutting is done. What is the result? Mr. A uses his machine without breakage, and at the end of twelve years has not paid to exceed \$60 for repairs, and it really looks less worn than Mr. B's after two years' use. Indeed, it is so fresh in paint and parts that it sells at auction, notwithstanding the improvements that have been made since its manufacture, for one-fourth the cost of a new machine. Mr. B's machine needed repairs that at the end of the third year exceeded in cost all the repairs of Mr. A's for twelve years, and so on until the sixth year, when it was thrown aside and a new one purchased, to be

used and cared for in the same way. The account will stand something like this:

1868	Mr. A.	Dr.	1868	Mr. B.	Dr.
To mower and reaper.....	\$180		To 1 machine.....		\$180
“ repairs, 12 years.....	60		1874, To 1 machine.....		170
“ Interest at 7 per ct., 12 yrs..	151		Repairs for 12 years		120
			Interest.....		222
		\$391			\$692
		Cr.			Cr.
By 12 years' use at \$40 per year	\$480		By 12 years use		\$480
“ machine sold.....	40		“ machine (worthless).....		---
		\$520			\$480
		391	Balance		212
		\$129			\$692

Mr. A's care has saved him \$129 + \$212.

Mr. B's carelessness has cost him that amount.

I have, perhaps, taken an extreme case, for I desire to impress you with the great loss to the individual farmer because of this lack of care of implements. Surely such a commentary of facts ought to open our eyes to the truth, and lead us to seek a better way. I desire to say in this connection that I believe if farmers would make it a rule to have all implements brought in every night, and put in their proper places, they would find it profitable. It may seem, at first thought, too much work and little profit—a small thing, but how often a plow, a harrow, a double shovel, a horse rake, or a corn cultivator may be left at night with the expectation of using it the next day, but a storm comes, and two, three, or more days often elapse before work is resumed. It has been injured more by exposure than it would have been by use, and it is rusty, and it takes time and muscle to put the implement in good working order. I repeat it is true economy to carefully shelter all farm implements, to keep them well painted and in thorough repair. I must not forget in this connection to speak of the manner of some farmers in keeping their machinery in some open shed—which serves the double purpose of a tool-house and a hen-roost. Who that has seen implements covered with the droppings of the feathered inhabitants of the barnyard until they resemble a bank of Peruvian guano more than tools designed for the use of man, has not felt that while such a union of interests might not be objectionable to the fowls and the tools, it must at least be incompatible with the feelings of the workman who has to use them, and inimical to the neatness and order that are so desirable in farm surroundings.

I should omit a very important part of farm economy if I failed to speak of economy in buying and selling farm products. The farmer may plan wisely, employ labor and time to good advantage in the growing and handling of his crops and care of his stock, but unless he has the knowledge of sound business principles, the wisdom and tact to use them successfully in the selling of his products and the buying of his stores, he will lack an essential qualification for his business. The farmer who puts his products in good shape, who represents his goods fairly, who is ready to sell on a fair market at a reasonable

margin of profit, who never haggles or jells in selling or buying, soon secures a reputation for honorable dealing that is above price. Farmers as a class are often accused of sharp practices, but I do not believe that they are sinners above all the Galileans in this regard. They are sometimes tempted to add to their profits by deception, and yield, but certainly not more frequently than men engaged in other callings. Spurious pedigrees and misrepresentations have too often hindered the introduction of good stock, and largely interfered with the legitimate business of reputable breeders, but these are the exception, not the rule. "There is a time and tide in the affairs of men," so of markets.

To know the opportune time is the height of wisdom. No man can always decide wisely; but much can be learned from a careful study of the markets, as given in our leading agricultural journals, and observing closely the practice of successful farmers about us. When a product brings a fair price it is best to sell, rather than to hold for a larger prospective price. It is usually the case when a man becomes too avaricious in this regard he is likely to take less than more. Most products are retained at some waste. The interest on the money is quite an item in the account, and I think those farmers who sell their crops when prepared for market are, as a rule, the most successful. I have no sympathy with that goodishness that relies *implicitly* on the good will and faith of every man we meet in business relations. The farmer must be on the alert, so wide awake as not to be caught napping by irresponsible and dishonest dealers; who are in every community ready to entrap the unwary husbandman, and they are not a few. But the farmer who knows what he has, its weight, measure, and value, who is straight forward and honorable, and who is keen enough to perceive any intended fraud in him with whom he deals, and resent it in a gentlemanly way, such a man will usually receive fair treatment, for he proposes to give what is right and to demand what is right in return.

Sound economy counsels such outlay as will each succeeding year add to the development of our mental resources, through the perusal of valuable periodicals and books; such outlay as shall add to the graces of our homes by surrounding them with trees, fruit, and flowers, filling them with books and healthful recreations, making them homes in the best sense of that sweet word. But some may say this advice is strangely out of place with my subject. I know some farmers object to outlays for such purposes as I have named, and call it all fancy work, but I tell you they make a grave mistake. The farm that has a home-like, tasteful house, with fruit and shade trees, that cost but little more than the planting, such a farm at a forced sale will bring from 25 to 30 per cent more than the same farm bare of trees, with a box for a house, and with every mark of neglect about it. Labor and money, wisely expended in beautifying farm surroundings, invariably enhances the value of our own property and of all that adjoins us. The farmer who pays no attention to his home surroundings not only lessens the value of his own estate but the selling price of the lands about him.

A celebrated painter on being asked what he mixed his colors with to render them so perfect, replied, I mix them with brains. That is the material with which every man should mix his colors, and the farmer as well as other men. He should rear his animals, fertilize and cultivate his fields, select and dispose of his stock with brains, using his own, and those of other men as much as possible, remembering that "he who makes agriculture not merely productive but honorable, who unites knowledge of his calling with the intelligence of a citizen, who knows his rights and is determined to defend them,

who shows that his business is favorable to mental culture and as fair a road as any to political eminence, such a man does more to encourage the profession than all other causes combined." I can only incidentally allude to the saving, proper care, and application of everything that will add to the fertility of the soil—the arrangement of fields and buildings so as to utilize labor and blend convenience in use with harmony in arrangement. Premises to be kept neat and trim—especial attention to be given to the grounds about buildings, obeying the apostolic injunction, "let everything be done decently and in order."

Time will only permit me to refer to the economy of a good vegetable garden, and a good supply of small fruit. I have not called your attention, my friends, to any remarkable discoveries, to any new facts in relation to your calling. I have only reiterated what you have known and felt since you first gave thought to this subject; but in farming, as in religion, it is well often, indeed there is great need of stirring up our pure minds by way of remembrance. So I emphasize these simple, every day facts that have to do very intimately with the farmer's life and home, for it is not by great and splendid particular improvements that the interests of agriculture are best subserved; but by general and gradual changes. Most is done for agriculture when every farmer is incited to small attentions and incidental improvements, such as proceed from the constant application of a few plain and common-sense principles, the basis of a sound and true economy. We have too many farmers who are always looking for great things, always trying to do great things. Cæsar was a magnificent general. His plans and victories were colossal; but his success, history informs us, was largely due to the fact that he gave careful attention to the small and unexpected details which other generals never thought of. And I believe our farming generals are men of this type—men who are not above the details, who look after the little things, who are economical in a wise and judicious sense.

INSECTICIDES.

BY PROF. A. J. COOK.

[Delivered at Caro and Otsego Institutes.]

Any substance to be used against injurious insects must be inexpensive, efficient, safe, and convenient of application. Where the foliage of our plants or our fruits are eaten by insects in any of their stages, the arsenites—Paris green and London purple—are almost always efficient, and leave little to be desired in case it is safe to use them. In such cases white arsenic—arsenious acid—should never be used. It is quite soluble in the soil, and is much more apt to be mistaken for some harmless substance than either Paris green London Purple, and so its use is attended with danger. These articles are to be recommended as a specific against insects that defoliate our fruit or shade and ornamental trees. On fruit, too, if the same is not to be used till some weeks after the poison is applied, as in case of its use to destroy the codling moth larva, it is safe to use these arsenical poisons. In case of such vegetables as cabbages, where the poison is so apt to gain a lodgment, where even

heavy rains can not remove it, such poisons should never be used. Their use is *never* to be advised either in cases like the currant slug, where the fruit is likely to be used at the same time that we need to use the poison. In case of the rose slug, too, where the leaves or flowers might be picked and eaten by children with fatal results, we should always resort to other means.

Again, some insects like the lice and true bugs do not eat our plants, but insert their beaks through the bark and any substance exterior to it and secure their food by pumping out the sap. Of course we can never kill such insects by use of Paris green or other similar poison. These difficulties have led me to experiment as I have found time the past few years, in hopes to discover some substance or substances that would be effective in such cases, and free from all objection.

PYRETHRUM.

This powder, also known as insect powder, I have found to be one of the substances which is demanded in this warfare. Pyrethrum is cheap, entirely safe, and, wherever it will destroy, is all that can be desired. As a powder it can easily be blown into our rooms, where it sounds the death knell to the annoying house flies. What a boon it would have been in pioneer times, before the advent of screen doors and windows, when the gay and festive mosquito called forth, even from worthy lips, epithets more emphatic than refined.

The past summer I gave this substance a thorough trial, and with great success, on the currant slug, the rose slug, the green cabbage caterpillar, and the zebra caterpillar, the black and yellow striped larva which has been so serious a pest in the cabbage and ruta-baga fields of our State the past season. To use this on outdoor insects, I know of no way more convenient and effectual than to mix it with water. I have found that a heaping table spoonful to two gallons of water, about the proper proportion. In applying it is better to force it on by use of a force pump, like the Whitman's fountain pump, which is the most convenient instrument of the kind that I have ever seen, than to sprinkle it on by use of a watering pot. This poison kills, not by being eaten, but by mere contact. It will readily appear that when the liquid is sent on to the plant in a jet it will scatter and touch the devastating insects, when if simply turned on it would fail to reach many, and so could not destroy. I think this accounts for some of the unfavorable reports which we have heard in the use of this valuable specific in battling the "cabbage worms."

There are two objections to pyrethrum. The first, not a very serious one, is that the active element is somewhat volatile, and so, unless the powder is kept in close vessels, it loses its virtue. To remedy this evil, we have only to keep it in close vessels. Some which I have kept corked in a bottle was as effective this year as when fresh two years ago.

The more weighty objection is that the powder will not destroy all insects, although S. N. Milco, who sends out fresh and most excellent powder from his extensive plantation at Stockton, California, guarantees that it is universal in its destruction of insects. I find that most true bugs, and many beetles, are not injured by its use. Thus I find that it has no apparent effect on the squash bug, or the tarnished plant bug. I have also tried it on several small beetles which attack grain in our storehouses and mills, with no effect, so far as I could observe. I would, therefore, advise the use of pyrethrum in case of all larva that defoliate our plants, when the use of the arsenites is not

permissible. In case of the slugs and such insects as the two species of cabbage caterpillars, just now referred to, it leaves little to be desired.

But we still have such insects as the squash and other bugs, which refuse to eat our poisons, and laugh us to scorn when we storm their citadels with to them the harmless pyrethrum.

For the past two or three years I have used kerosene with excellent success in fighting plant lice. I made a strong solution of soft soap, and while the liquid was hot I stirred in kerosene oil in the proportion of one to eight or ten of the suds. I found this effective to destroy the plant lice, the grape flea beetles, both larvæ and beetles, and the cabbage caterpillars just now referred to. The past season I and several of my students have used milk—sour milk is as good as any, and most economical—which was first suggested, I think, by Dr. Barnard, and has been so highly recommended by Dr. C. V. Riley. I do not think the churning that he recommends is very necessary. It is very easy and convenient to mix the oil with liquid sour milk, and when well stirred it mixes well, and remains mixed for several minutes, so that there is no practical objection to its use. Several of us experimented, and in no case did we injure any plant, when the mixture was as weak as one of oil to five of the milk. I tried this on several kinds of bugs, on various beetles and on many caterpillars and plant lice. In every case it killed the insects with no injury to the plants.

In applying this to such insects as the squash bugs (I mean the large black squash bug, not the small striped squash beetle), I found it necessary to throw the liquid on to the insects with force. When sprinkled on it does not produce the desired effect. Here then we need a force pump.

While this liquid will kill both the caterpillars that feed upon our Michigan cabbages, some may object to showering their cabbage with kerosene. Several who have tried it the past season say that they find no objection to its use on these vegetables. If any do object to such use, they still may have recourse to pyrethrum, to which there can be no objection.

THE MANUFACTURE OF SUGAR.

BY HON. ENOS GOODRICH.

[Delivered at Caro Institute.]

The question of our sugar supply is one of vast importance and stupendous proportions. In the days of my childhood sugar was a luxury that few could indulge in, but in the march of time it has passed from the catalogue of luxuries and must now be classed as one of the necessities of life. Chemically, the article of sugar exists in most vegetable substances; but those from which the country's supply is produced may be set down as the forest maple, the sugar beet, the ribbon cane of the south, and the sorghum of the middle and northern States. It is awkward for me to state that I have no means of telling you how much is annually produced from each of these sources. In 1880 we had a census, but if ever its results should reach the light of day they will be too old to be of practical importance. My children's children may live to read it, but I have given it up in despair. I shall speak approximately, and weary you as little as possible with figures and technicalities.

Our population, which is over fifty millions, consumes annually something like two and a half dollars worth of sugar and syrup per capita, making a gross sum of not far from one hundred and twenty millions of dollars. About one-eighth of all this sum is home production, while the remaining seven-eighths must be imported from foreign countries. This supply comes chiefly from the West India Islands, causing a draft of nearly a hundred million dollars upon our people. No other commodity that we purchase from abroad assumes such gigantic proportions, consequently none of greater financial importance. And must this drain upon the vitals of our country ever continue? Where are our statesmen that they do not awake to the subject and arouse the country? When the elder Napoleon was at war with the outside world, and like Ishmael of old had "his hand against every man and every man's hand against him," his fruitful genius could take a short furlough from the camp fire and the battle field, wing its way to the halls of legislation, and there devise means for his country to supply itself with sugar from the beet. And so finely did this beet sugar industry become established under the wisdom of his counsel that it not only supplied the wants of the home country in time of war, but long afterwards flourished as a staple article of exportation in time of peace. But of late years our country abounds in men who wear epaulets and titles, but *we have no Napoleons*.

We have said that about one-eighth part of the sugar consumed by our people is of home production. Three quarters of that eighth part, speaking in round numbers, is produced from the "ribbon cane" of the south—and of all that which is produced in the south only nineteen-twentieths is the product of the State of Louisiana alone. Could the area of its production be spread upon a map before you it would be seen that it is confined to less than one-hundredth part of our country's domain. Until a very recent date this speck upon the map of country has been considered the only part of all our ample realm where sugar could successfully be produced. The maple sugar of Vermont, with trifles from a few other States, would be but as dust in the balance, and until recently all efforts to produce sugar from the beet in remunerative quantities have proved unsuccessful. Late experiments, however, have conclusively demonstrated that California may yet become a successful field for that industry, and should the efforts now commenced be persevered in the time may yet come when California sugar will assume greater national importance than California gold. Should our government succeed in conquering the Mississippi and keeping its waters within their banks the area of the ribbon cane will doubtless be doubled. And that may yet be done, for, after munificently expending hundreds of millions in the improvement of northern lakes and rivers, our Congress is at last beginning to turn its attention to that greatest of all our internal thoroughfares. But while this process is going forward our population and consumption will steadily increase, and the question still stares us in the face: Where shall we look for our supply of sugar? That question is now in process of solution, and I now venture to predict that in the course of time, say in twenty-five years from to-night, or about the time that our savans at Washington will probably complete the publication of the census of 1880, our country will be sending sugar to the countries of Europe, side by side with its cotton and its wheat.

A little over twenty years ago there began to be introduced into our country a new cereal; it was called sorghum or Chinese sugar cane. Who does not remember having seen it in gardens, and even to-night methinks I can almost

hear the wind whistle through its frost-bitten leaves. A few efforts were made to convert it into sweets for the table, but, as a rule, they were miserable failures; and even to the present day the bare mention of the word "sorghum" almost operates as an emetic upon weak stomachs. But while the unthinking masses had become disgusted and faithless there was a thinking few whose minds grasped the fact that the Chinese cane, under all its opprobrium and prejudice, was very rich in saccharine matter; but individual knowledge of this fact had scarcely kept its memory alive, but for the persevering efforts of one single man. That man was the honorable W. G. L' Duc, our late Commissioner of Agriculture. Deeply imbued with a conviction of the intrinsic value of sorghum, or Northern cane, as it is now appropriately named, he instituted and for years continued a series of experiments in which the scientific and practical were combined. Much ridicule was heaped upon him by the unthinking public, but still he pressed steadily and perseveringly forward. It was Byron who said of old General Suwarrow—

"Your wise ones sneered at him in phrases witty,
To which he answered not—but took the city."

This was substantially the case with Commissioner L' Duc. There are living men, who ten years ago ridiculed his action, who would now be glad to arrogate the credit of this action to themselves. Those musty and prosy and much ridiculed volumes went out from the Department of Agriculture throughout the land. A few men besides myself thought them worth reading. Some proved to be "seed sown in good soil," though much of it "fell upon rocks and among thorns." After a long silence, the first voice we heard was from far off Minnesota. There in their frigid and snow-bound climate they had acclimated this semi-tropical cereal, and succeeded in perfecting a variety now known far and wide as the Minnesota Amber. Meanwhile, a four-years war had cut off our intercourse with the south, and almost annihilated our foreign commerce. In the absence of sugar from Louisiana and Cuba, the home-made production tasted better than ever before. Southern Ohio, Illinois, Missouri, and Kansas all began to dabble in the sugar business with varied success. Whether these experimenters stimulated the Department of Agriculture, or the Department stimulated them, is a question I will not further discuss, but will proceed to results. Careful experiments, aided by science, demonstrated that the northern cane possessed as pure elements of sugar as the cane of the south. It was found that defecation, or cleansing as we used to call it in old sugar bush vocabulary, could remove all unpleasant flavors and produce a syrup as pure and palatable as strained honey, and a sugar equal to the best granulated article on the market. Very few persons in these parts have any conception of the magnitude of this new sugar industry. It is receiving more or less attention in almost every State in the union, south as well as north. Kansas now holds the front rank with a production of 3,899,440 gallons of syrup in 1881, and 6,181,020 gallons in 1882. From other States of the union we have no condensed statements, but I trust no one will accuse me of extravagance when I assume that all the other States combined must have produced as much as Kansas. There we have a total of 12,362,040 gallons as the product of the northern cane crop of 1882. Kansas estimates her product at \$2,781,459, which doubled would produce the sum of \$5,562,918. Now the sugar crop of the south for 1882 was unprecedentedly large, being estimated at 250,000,000 pounds of sugar and 18,000,000 gallons of syrup. For purposes of comparison were this all reduced to sugar, it would appear that about one-quarter of the entire quantity was the product of the

northern cane. When it is considered that this industry is in its infancy, when it is remembered that the southern sugar industry, in its first inception, languished for long and anxious years, and at times threatened to baffle the efforts of the most skillful, the result is certainly very flattering for the cane of the north.

But I feel that the past unpropitious season has fallen like a wet blanket upon this young and undeveloped industry. In the more northern States it has proved a sad failure, and many who were its former advocates will now be dumb with disappointment. And right here I wish distinctly to say, it is no purpose of mine to advise my northern neighbors to rush hastily into this new business. On the contrary, I would say to all, *go slow*, feel your way, and be careful. Let all first experiments be on a small scale, but let them be carefully managed. Give the business a fair show; give your experiments the benefit of good ground and good tillage, and study as you proceed. Of course you will make some blunders; but bear in mind our best lessons are derived from adversity. Did not our great national crop of Indian corn fare just as badly as the northern cane? How many of you will abandon it for that reason? How many of my brother farmers have resolved to run their farms without the indispensable corn field? If there were one I am certain he would be considered a fit subject for an insane asylum. And still you must remember that the corn crop has the advantage of long years of experience, while cane culture in the north is a new industry. But right here in Tuscola county several parties have embarked in it, and all have met with a measure of success; and where failure has attended their efforts it was not always the fault of our high north latitude. Want of means has sometimes been the cause, and still oftener want of knowledge and professional skill.

Time will remedy these last difficulties, and acclimation will do much towards remedying the former. But while the results in this latitude will always be of but local importance, it is to the southwest that I look for the sugar industry to assume its great national importance. We have already shown that the State of Kansas alone, in 1882, produced over six million gallons of syrup from the northern cane, having nearly doubled its quantity since the last previous year. Think of it for a moment. Kansas alone is capable of supplying this great national want, and yet not materially interfering with her great staple, corn. Take her crop of 1882, which was then \$2,781,459, and let it be doubled once in three years for six periods, and in eighteen years we have attained the gross sum of \$178,013,376. Now, if any man thinks that Kansas has not room for this vast achievement let him make the computation for himself. He will find that with a breadth of 200 miles and a length of near 350, and a production of \$40 per acre, it would only require about one acre in twenty of that giant young State. I cite Kansas for two reasons: first, she has already placed herself foremost in the production of this commodity, and second, because her silicious soil and arid climate seem to be just what is required for the most perfect development of the northern cane. But these natural qualities are not confined to Kansas alone. From the mountains of Missouri to the Colorado hills, and from middle Texas to northern Nebraska the same state of facts in a great measure exists. Who, then, says that we cannot emancipate ourselves from this annual drain of a hundred millions in the purchase of sweets for the American table? We have shown that one state of this American union is capable, not only of stopping this vast outlay, but of bringing back the same hundred millions per annum in less than twenty years.

Before closing this article I must be permitted to cite in detail a few practical facts: Hon. O. S. Powell of River Falls, Wisconsin, at the convention of the Mississippi Valley Cane Growers' Association at St. Louis, Missouri, one year ago, stated that on that year he had produced from 60 acres of ground eight and four-fifths tons of corn stalks per acre, producing $14\frac{3}{4}$ gallons of syrup per ton, equal to 128 gallons of syrup per acre on a 60-acre tract, and that over 200 miles north of us, and within 40 miles of the city of St. Paul. A Mr. Stout of Kansas, at the same convention, reported from 125 acres an average yield of a little over 10 tons of stalks per acre, and $12\frac{3}{4}$ gallons of syrup to the ton, and $127\frac{1}{2}$ gallons of syrup per acre. Mr. Allen of Kansas, from 25 acres produced nine tons of stalks to the acre, yielding 13 gallons of syrup per ton, or 117 gallons of syrup per acre.

Perhaps the most extensive establishment in the country, or the world, engaged exclusively in manufacturing sugar from the sorghum or the northern cane, is the Rio Grande works in Cape May county, New Jersey. In 1882 this establishment planted over a thousand acres. Bad weather caused them great trouble, and necessitated the planting of some of their ground three times over, occupying a planting season of near two months, from the middle of April to the middle of June. But perseverance generally insures success, and their case was no exception to the rule. After manufacturing 600 acres of their cane they report a yield of 10 tons per acre, or 6,000 tons of cane, turning out 337,250 pounds of sugar, and 55,000 gallons molasses.

Value per acre, 562 lbs. sugar at $8\frac{1}{2}$ cts.	\$47 77
Value per acre, $91\frac{3}{4}$ gallons syrup at 40 cts.	36 67

Total product per acre on 600 acres	\$84 44
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Next to the Rio Grande works, one of the most important in the country is the Champaign works of the State of Illinois. Their entire acreage is not given, but from the season's business of 1882 they report a product of 125,000 pounds of sugar and 22,500 gallons molasses, with an average return of \$75 per acre.

Instances, almost without number, might be multiplied, but we will dismiss this branch of our subject by a brief quotation from our own Professor Kedzie, at the same convention, who reported from our Agricultural College farm a yield at the rate of 150 gallons of syrup to the acre, "choice and carefully made."

I had prepared some data touching the manner of manufacture, and the machinery and ingredients used, but they must be omitted.

When the boundless resources of our country are fully developed—when the American people cease to call on their law-makers for protection, and embrace the theory of old Dr. Franklin, that "God helps those who help themselves," then will the granaries of this Egypt of the western world pour forth their contents to relieve the famishing millions of overcrowded Europe—then will our surplus sugar go forth side by side with our wheat and corn, and our surplus wool beside our cotton—no Chinese wall in the shape of revenue laws, will separate us from the outside world and prevent the industrious, the poor, and the needy on both sides the great water from purchasing the necessities of life at the price of production, and we shall be at least one step nearer what we have so long professed to be—a free people.

NOTE—This concluding remark is suggested by the recollection of the fact that the American consumers are paying not far from thirty million dollars a year for the privilege of buying their sugar from other countries.

OUR FAIRS AND HOW TO IMPROVE THEM.

BY HENRY FRALICK.

The formation of agricultural societies, now so numerous in this and other countries, belongs chiefly to this century, though their origin dates further back. In Great Britain the Highland Society of Scotland, the oldest in the kingdom, was formed in 1780. Some small associations of similar character may have existed at the same time on the continent of Europe. In our own country the first steps towards such organizations were taken shortly after the close of the war of the revolution. Several gentlemen who had occupied prominent military and other positions during that contest, on returning again to agricultural pursuits, and seeing the low condition into which agriculture had fallen during the long period when the mental and physical energies of the people had been almost entirely absorbed in the great struggle for national existence, resolved to associate themselves together for the improvement of that interest which they well understood constitutes the foundation of the country's prosperity.

This association was organized in 1787 and was called "The Philadelphia Society for the Improvement of Agriculture." It numbered among its members George Washington (as an honorary member), Robert Morris, Richard Peters, Timothy Pickering, and other distinguished men. Pickering, who was Secretary of State under Washington, returned to Massachusetts, his native State, on leaving that office, and took an active part in the Massachusetts Society for promoting agriculture, which was formed in 1792, and included among its members many of the leading men of the State—the eminent Samuel Adams being its first president.

The New York State Society for the promotion of agriculture, arts, and manufactures was organized in 1793, with Chancellor Livingston at its head, and Dr. Samuel L. Mitchell, John Jay, Horatio Gates, and other eminent men as members. County societies were formed in several of the States before the close of the last century. But it was not until the war of 1812–15 that these societies became general.

The Massachusetts Society held its first exhibition at Brighton in 1816. This appears to have been the first State exhibition in the country. The society made annual exhibitions for many years. They attracted great attention, were attended by leading agriculturists from all parts of the country, and undoubtedly exerted much influence towards the introduction of similar exhibitions in other States.

Before the establishment of exhibitions societies directed their efforts mainly to bringing out papers or essays in answer to questions propounded. Much valuable matter was brought out in this way; matter which even now may be read with advantage. Some societies, like that of Massachusetts, offered premiums for the introduction of specimens of breeds of domestic animals, implements, seeds, etc., which were thought to be desirable. Merino, Leicesters, and Texel sheep and Short-horn and Holstein cattle were introduced into Massachusetts under these offers. Premiums were also offered for experiments.

The Philadelphia Society published its doings in volumes entitled "Memoirs," etc.; the Massachusetts Society published its "Repository and Journal;" and the New York Society issued its "Transactions."

Any person who will take the trouble to look over these old volumes will find

that the men who were able to make a nation were close observers of natural laws as connected with the growth of plants and the sustenance of animals, and that our indebtedness to them is not confined to the victories achieved on the battle-field, and the advantages of a free government, but consists in no inconsiderable degree in facts established and improvements made in agriculture. The fundamental idea in the organization of agricultural societies was to better the condition of the farming class by introducing such improvements in the various branches of husbandry as would secure the best returns for the outlay of labor and capital. Of course the plan was intended to include encouragement to those branches of industry with which agriculture is connected. When Legislatures incorporate agricultural societies or provide for their organization, it is on the understood condition that they shall attempt the *improvement* of agriculture. It is with this view that they are allowed to draw money from the State treasury, or obtain it from the people. The matter may be regarded in the light of a contract, the officers of societies pledging themselves to use the powers conferred on them as specified. The means by which agricultural societies can effect improvement may be enumerated as follows: 1. The holding of exhibitions at which premiums are given for specimens of superior merit or excellence in the different departments to which their supervision is extended. 2. The bestowment of money for making experiments to settle doubtful questions. 3. The publication of special papers or essays comprising useful information. Of these, the holding of fairs for the exhibition of articles and animals is the most prominent, though not necessarily the most important. The influence of these exhibitions depends very much on the manner in which they are conducted. To effect the greatest good by these exhibitions much judgment is required in the offering of premiums, and at least equal judgment, accompanied by a good degree of independence exercised in making the awards. In general the amount of the premium should be graduated by the value and utility of the object for which it is offered. Exceptions, however, may properly be made in reference to objects which require special encouragement for a time, or those the immediate introduction of which it is desired to effect. An important object of these societies should be to establish correct standards by which animals and articles should be judged. The terms in which premiums are offered should be based on such standards, and should, as far as possible, convey a clear idea in regard to them. The mere use of the word *best* does not express sufficiently clear as to what constitutes excellence. It is sometimes said that this should be left to the awarding committees. But it is improper to leave it to them, because different men are appointed to judge the same things at different times, and their ideas in regard to standards of merit may not agree. Thus, instead of establishing uniformity in regard to the things judged, the decisions might nullify each other and nothing would be established. A reasonable supposition is that the society seeks to make improvement in everything for which it offers premiums, and that it has fixed certain standards in reference to which the awards should be made. On this ground, agricultural societies and the result of their fairs become, as they should be, *correctors* of public opinion. The animals or articles on which premiums are awarded may then properly be presented as examples for imitation. The early but enterprising settlers of Michigan, knowing the great importance of a thorough education in the business of the life of a farmer and cultivator of the soil, and recognizing the value of this State for agricultural purposes and the importance of association for the proper development of that interest,

organized for that purpose the Michigan State Agricultural Society in the year 1849. Its progress for a time was slow. The people and State were poor, not only in purse but in the necessary knowledge of agriculture and its kindred arts. But its founders and supporters were men of the right stamp. They adopted "Excelsior" for their motto, and the result is now before the people of the State.

It was the fruitful gem (well cultivated), from which have sprung as auxiliaries and co-educators of our people, no less than thirty county and district agricultural, pomological, and horticultural societies in this State, some embracing as many as twenty counties, also a large number of farmers' institutes, cattle, horses, sheep, and swine breeders' associations, in various parts of the State, and all of which are in a prosperous condition, disseminating valuable information, and at their fairs annually disbursing premiums and awards by the thousands of dollars, and which are attended by tens and twenties of thousands of people.

The members and friends of this society were the first to organize in the United States a successful Agricultural College, which is thoroughly practical in its aims and objects. "Its classes are taught in the fields as well as in the recitation rooms. No time or attention is given to ancient or foreign languages, but thorough training in the English language and literature is provided for, and especial attention is given to the practical sciences, and their application. For example: It at present teaches surveying, leveling, the laying out of grounds, mechanics as applied to implements, building, stock-breeding, agricultural chemistry, and horticulture, and experiments for the promotion of agriculture are systematically and continuously prosecuted, and their results are given to the public in the annual reports of the State Board of Agriculture, and in lectures delivered by members of the faculty at farmers' institutes, which are now held annually in all parts of the State, and which have proved of much value to the farmers of Michigan," and while the means have been so well and liberally provided in our State to become an educated and thereby a successful agriculturist.

In no state of the union is the fact more thoroughly recognized and acted on than in Michigan, that to be a successful farmer it is essentially necessary to have an agricultural education, either book, practical, or both, which will embrace a thorough knowledge of the soil, its strong and weak points, its best natural productions, the manner of its best and cheapest permanent drainage, the character and kinds of fertilizers the best adapted to the soil he cultivates, of the best kind and quality of seeds to be used, that they were thoroughly ripened and carefully preserved for use when needed, and the kinds of fruit best adapted to the soil and general character of his farm. And no less to be a successful stock breeder and raiser of any kind (which has of late years become so important to the farmers of Michigan as well as most other states) it requires, first, a thorough and comprehensive knowledge of the subject, then time, care, good judgment in selections and management, and close attention to all the material points. When this information is obtained and properly applied they are certainly entitled to success, and nothing short of an act of Providence will prevent it.

THE BEST MANNER OF PREPARING THE GROUNDS AND CONDUCTING THE FAIRS.

Obtain for a State or large district fair not less than 60 acres of ground, and 80 acres if obtainable are better, of nearly level surface, a good, dry gravelly or loam soil is the best, well supplied with good water, and of easy, effective

drainage, situated near and of easy public access to a live, active city, on the immediate line or direct connections of at least two prominent railroads. The buildings should be commodious and of a suitable and permanent character, and so arranged that every different kind of animal, or article can be so placed that all of that kind or quality can be exhibited together, so that either visitors or viewing committee will be able with the least trouble and doubt to make proper comparisons of their quality, and consequently just awards. The building should comprise a large dining hall, to seat not less than 400 persons at a time, and should be directly under the control of the society to insure good and abundant fare and reasonable prices. There should also be a good lunch room near the president's office, capable of seating at least 40 persons at a time, for the accommodation of the officers, their invited guests, and viewing committee. It is a great convenience, almost a necessity, and saves much time, trouble, and expense.

All live stock, including poultry, should be entered on or before Tuesday evening of the week preceding the fair.

All farming implements and miscellaneous farm articles, and all heavy machinery requiring power, should be entered on or before Thursday evening of the week preceding the fair. All other articles should be entered on or before Tuesday, at 2 P. M., the week of the fair; and all animals and articles should be in their proper place on or before that time.

All persons entering live stock should at the time of entry give a list of the stock, stating the age and breed of the animal, the breeder's name and residence, and the particular class and division in which the animal is to be entered; and in case of thoroughbreds full pedigrees, duly certified, should be filed at the same time.

Power, ample room, and shafting for the proper exhibition of all machinery and implements, and the forage, stalls, and pens for all animals properly entered, should be furnished free.

All persons, except the officers, desiring to enter the fair grounds should procure tickets of admission of the treasurer. All tickets will be taken up at the gates (except season tickets if issued), and complimentary tickets where no coupons are attached, and no return tickets issued except to the grand stand for the same day.

ELECTIONS.

The election should be held annually on Thursday the week of the fair. One-third of the directors or executive committee should be elected annually, and hold for three years. The officers proper should be elected annually. A suitable ballot box to be provided and the election held at a convenient place on the grounds; proper notice to be given. Three suitable persons members of the society to be appointed by the board to conduct the election and receive the ballots of all persons who are entitled to vote, which shall consist of all members of the society of legal age. The judges shall require of each person offering to vote to present a proper certificate of membership, which will be stamped on the face of it by the judges or their clerk the word *voted*, and they shall keep a full record of names of all persons voting at such election. The polls to be opened at 9 A. M. and close at 5 P. M. Each member must vote in person. The names of all the persons to be voted for to be on one ticket, and the office designated. The votes to be canvassed by the judges and president, and the result publicly declared as usual in township elections.

The selling of spirituous liquors or other intoxicating drinks of any kind or

under any pretense, pool selling, offering speed premiums, gambling in any form, immoral or improper exhibitions of any kind, should never be licensed or permitted on any fair grounds.

There should be a general superintendent whose duty it should be to see that good order is kept and the rules observed; and it should be the *imperative* duty of every officer to immediately report to said superintendent or the president any violations of the rules coming to his knowledge.

No indebtedness of the Society should be incurred except by the persons duly authorized, and all bills or accounts should be certified to by the person making the account as correct if so before submitting the same to the auditing committee.

The office of the president, secretary, and treasurer, and all the superintendents of departments should be at a designated place on the fair grounds during the days of the fair.

Each department should be in charge of one or more members of the executive committee for directors.

The executive committee or board of directors should meet on the evening of each day of the fair at 8 o'clock P. M., at such place as the president shall designate, to transact such business as may be brought before them, and hear and dispose of reports of the executive superintendents.

There should be a good half-mile or mile track on the grounds with two good-sized grand stands, one for ladies and their escorts, and the other for gentlemen. The grounds and buildings should be opened to the public at 8 A. M. and close at 6 P. M. during the continuance of the fair, at which times every officer and employé should be at his post. There should be sufficient police and careful watchmen of all the grounds, exhibits, and buildings, who should be promptly changed at 6 A. M. and 6 P. M., but no one to leave his post until properly relieved.

Notwithstanding you have good grounds, buildings, offices, and good weather a fair will not be a success, either in exhibition nor attendance, without a good, liberal premium list well considered, wisely and carefully arranged, and well classified, in which every rule should be clearly but concisely stated, so that neither exhibitors nor judges need be in any doubt about their proper construction. Nor will good feeling and permanent success of a fair be obtained without its judges and awarding committees are persons of acknowledged ability and impartiality. They should all be selected and engaged prior to the meeting of the fair and when that important duty is carefully and conscientiously performed, and in sufficient time to verify their acceptance of the trust before the commencement of the fair, it saves much embarrassment and annoyance and gives the best opportunity to get the most suitable person for the duties required of them, for a few of the most important judges the superintendents should not be confined to the State for their selection (under and with the advice of the President). The rules should guard them from all interference in their assigned duties. In many divisions they are arduous and require much firmness, experience, time, and close attention, but when that duty is faithfully and wisely performed, all fair minded exhibitors will cheerfully abide their decision.

I have thus given a brief history of the commencement of agricultural societies and fairs in the United States and State of Michigan, their objects and value in their result which is almost inestimable, and far-reaching, and my idea in brief of the best manner of conducting fairs.

A word in conclusion: Michigan is comparatively a new State. When

the centennial exhibition was inaugurated and the commissioners from this State appointed to select and forward any exhibits that might be offered for the far-off exhibition, the response of the people of the State for the first few months was very discouraging to the commissioners, but as more correct information was disseminated, and the State pride appealed to (although the Legislature had appropriated only the small sum of \$7,500), the spirit of our people became aroused and when the exhibition opened it soon became an acknowledged fact that Michigan exceeded any other State in its exhibition of the products of its orchards, forests, mines, fresh water fisheries, salt, and manufactures from wood, and well to the front in its cereals and grasses, it took the first award on its school system, and had a very creditable show in many other important articles. The Calumet and Hecla Copper Mining Company, of the Lake Superior district, paid \$12,000 for a model of their stamping works beside the expense of transportation for the purpose of exhibiting it at the centennial, where it not only received the first award but universal favorable comment. With such a record for so new a State in competition with the world, language is almost inadequate to portray the great value to the best interests of the people of the State growing out of our system of education on the subject of agriculture and and its kindred arts, and for its illustration in a practical form growing out of the holding of State, district, and county fairs, and of the valuable education and emulation given to our producers by such exhibitions, and the resulting competition to excel in all their future efforts.

Therefore, I say, go forward with unabated courage, improve and add, *too*, where we can in the right direction, and if error of judgment or practice appear, prune it out with an unsparing hand, and the time is not far distant, if not already here, when Michigan will stand almost unchallenged at the front, not only in its university and system of literary schools, but in its cheap and efficient means and methods of imparting and obtaining not only a thorough educational but practical knowledge of the great and important subject of agriculture and its kindred arts.

EXPERIMENT STATIONS.

BY FREEMAN FRANKLIN.

[Read at Berrien Institute.]

Mr. Chairman, ladies and gentlemen. The subject assigned me (*viz.*, experimental stations) is one which, had I had any choice in the matter, I should have by no means chosen. The establishment of experimental stations or farms in the United States is of such recent date that but few statistics or reports are available from which to glean the necessary information to make an essay either interesting or instructive. But as it is not expected that the essayist should do more than merely introduce the subject to the attention of this intelligent body of agriculturists, I therefore feel less hesitancy in presenting this topic for your consideration. Since God issued the mandate, "By the sweat of thy brow shalt thou gain thy bread," labor has been a necessity with man. No occupation is so essential to mankind as that of agriculture; no

occupation precedes it. * It had its origin with the creation of the earth ; there is none more exalted ; God made it honorable, and it is our duty to sustain it as such. It is man's natural sphere. The great Creator designed man to till the soil, and consummated his plan by placing him in the garden of Eden. The greatest and the best of men in all ages have been encouragers and promoters of the art, and have never deemed it derogatory to their dignity to assist in the labors of the field.

Washington, in speaking of agriculture, pronounced it the most healthful, most useful, and most noble employment of man. No occupation is more pleasant or refining, or has a greater moral influence. In his daily toil the husbandman is in constant communion with nature. He sees the beautiful flowers. He treads the verdant fields. He listens to the babbling brook and the merry songs of the birds, and is taught by these evidences of divinity to look with reverence from nature up to nature's God. Man has found the earth in almost every clime covered with vegetation, yet this often yields little that he consumes. The spontaneous growth of nature affords but a limited quantity of food, and it is only after those plants which yield man an abundant supply of food are selected and thoroughly cultivated that population augments and civilization takes its rise. Hence those nations who are most largely engaged in agriculture, and foster and protect it, and use every means in their power to stimulate production and to disseminate a knowledge of the proper modes of culture, are the most prosperous, most prominent, and most populous, and reach the highest state of civilization and culture. History teaches us that those nations which cherished agriculture prospered, but when neglected, degeneracy began. The palmy days of the Romans were those when they gave the most attention to agriculture. At the present age of the world, with its teeming millions to be fed, clothed, and sheltered, it is of the *utmost* importance that production should be stimulated and increased by every possible measure.

We in the United States, with our virgin soil with its fertility undiminished, and with many thousands of acres uncultivated, do not feel the force of this. But in some of the older and more populous countries of Europe, the question of successful and profitable agriculture is a grave one, and one that fills them with apprehension. At a convention of the leading agriculturists of Great Britain, called with a view to ascertain the cause, and if possible to devise a remedy, for the decline of agriculture in the British Islands, the Duke of Argyle said : " This is a grave question which the people of the United Kingdom are called upon to solve. The English farmer must practice his art better, and with more intelligence, if he would succeed and be able to meet foreign competition." Now this is no less true with the American farmer. Russia has become a formidable competitor in the European grain markets, with her pauper labor, her facilities for transportation increased, and with a climate and soil especially adapted to the growth of the cereals, it behooves us to use every available means to increase our average yield and the certainty of our crops ; and this we can in a great measure do by a judicious selection of seed, better and more intelligent cultivation, with a greater knowledge of the wants of the plants we grow, by drainage, etc. To propagate and disseminate these seeds, and to conduct the experiments necessary to gain the knowledge of the best mode of cultivation, the best variety to use, and how to counteract the effects of bad seasons when the very elements seem to have conspired against the farmer, calls for the establishment of experimental stations or farms. But before treating further of this portion of the essay, I desire to

give you a few statistics and facts to show the magnitude and importance of our agricultural interests. We have three great national industries, viz.: Agricultural, manufacturing, and commercial, and I have named them in the order of their importance, and if for any reason either should decline, all must suffer, as they are all closely allied and mutually dependent on each other.

I find in looking up our exports from the year 1868 to 1878 that the proportion our agricultural exports bore to all others was 82 per cent, or a little over four-fifths; and I copy from the *Detroit Free Press* of December, 1883, the following: "The excess of exports over imports during the past year was \$100,658,000. The exports of the products of agriculture amounted to \$619,000,000. The exports of the products of manufacture amounted to \$112,000,000, being larger than any previous year." Thus you will see that our agricultural exports were nearly six times as large as those of manufacture, or that about \$86,278,000 of the \$100,658,000 of excess is due to agriculture; comment therefore is unnecessary. It proves that the financial interests and prosperity of this country are almost wholly dependent upon the products of our farms. A few more figures and I will cease to weary you with dry statistics. The Industrial Statistical Congress, which assembled in St. Petersburg in 1872, confided to the statistical corps of the French government their compilation of the agricultural statistics of Europe, from which I copy a few brief extracts. The average annual production of cereals of all kinds in Europe is estimated at 5,153,808,000 bushels; of which Russia produces 1,657,392,000 bushels, or nearly one-third; Germany, 766,260,000, or 15 per cent; France, 709,500,000 bushels, or 14 per cent; Austria and Hungary, 567,600,000, or about 11 per cent. These statistics also contained the per cent of available lands in the different countries which were being cultivated, but I will not weary you with them, except to say nearly all the countries, except Russia, were cultivating all their tillable lands; Russia only about 58 per cent of her land that could be made available for agricultural purposes. Russia is wisely using every means to increase her agricultural products and to facilitate the exportation of them. Seeing the want of knowledge on the part of her husbandmen she is establishing experimental farms in various places through the Empire under the supervision of scientific and practical men, with means to conduct experiments to a successful issue, and to teach her subjects all that pertains to agriculture. To facilitate exports she is increasing her shipping, building railroads, canals, etc.

In comparing these statistics with those of the United States, I find that we produce about 1,600,000,000 bushels, or a little less than Russia. The other provinces of Europe do not produce as much as they consume. Hence Russia and the United States must supply the deficiency. Therefore the necessity on our part to keep pace with, and if possible to outstrip, Russia in our ability to produce, and to lessen the cost of production. Mr. Chairman, without doubt there is no other profession or occupation which is as loosely managed, and which is conducted with as little knowledge of its requirements, and with as little effort to excel, as that of farming. Very few farmers ever conduct any experiments to ascertain any fact in relation to their occupation, and if they do, from want of care or knowledge, or from the lack of time and means, they must always prove failures. How many farmers within the sound of my voice to-day can tell how many pounds of corn it takes to produce a pound of pork, and yet how essential to know to be able to dispose of our corn

crop to the best advantage. How many are there who can tell which crop pay the greatest profit, or which their soil and climate are best adapted to.

I am forcibly reminded of the difference in effort made by farmers and those of other occupations when I recall a visit made to the great shops of William Deering & Co., of Chicago, manufacturers of reapers, mowers, twine binders, etc. In showing me around their extensive factory, I came to a room in which were quite a number of men at work, and my guide explained by saying, *this* is our experimental room. He said they employed about twenty of the most skillful and practical mechanics and inventors, all the while, who did nothing else but experiment, with a view to improve their binders and other machines, and at the same time to cheapen their construction, if possible. These experts were sent into the fields to carefully watch the workings of the machines, and if any part failed to do the work satisfactorily, or was too light to be durable, or was too cumbersome and could be made lighter without sacrificing strength and durability, it was reported, and experiments were immediately made to remedy the difficulty, and they keep trying until the desired result is obtained, and many thousands of dollars are thus expended in experiments which prove fruitless. Still, in the end it pays them, for only by this means are they enabled to keep pace with other enterprising manufacturers, and be able to furnish a machine with the latest improvements. As a result of one of their experiments, and through the skill of one of their experts, they were able to dispense with about twenty pieces in their twine-binder, which rendered it less liable to get out of repair, and more durable, and lessened the cost materially, and made a rich harvest, not only for them, but also for the inventor; and, Mr. Chairman, ladies and gentlemen, if so much effort is necessary for the production of a few of the implements of the agriculturists, how much more essential is it that the farmer himself should use every means which can be devised to increase his knowledge and chances of success.

It is true we have a commissioner of agriculture at Washington, with an experimental farm, and many of the States have agricultural colleges, to the most of which are attached experimental farms. Our own State boasts of one of the very best, which under the management, and by the instruction of its very competent President and Professors, is doing a great deal to advance the agricultural interests of Michigan. They have awakened among the farmers a thirst for more knowledge in their profession, and the intelligent farmer is beginning to realize the necessity which exists for more extended and carefully conducted experiments, and we realize, Mr. Chairman, that an experiment which may have proved a grand success in the vicinity of Washington, or even at Lansing, with us under different climate influences and a different soil may prove a disastrous failure, and as a consequence we are deterred from adopting the mode of culture suggested, or from propagating the seeds distributed. Now, if we could have experimental farms in different parts of the country so located as to embrace every variety of soil and climate, and have them under the supervision of scientific and practical men, with sufficient means to carry the experiments to a successful issue, then every farmer in a similar climate, and having a similar soil could safely put into practice what was recommended, and would thus avoid the costly failures which often follow his efforts to grow a new variety of seed.

I presume almost every farmer present to-day, has noticed that for some cause or other, for which I am unable to account, that, after a few years, a

variety of wheat that has yielded well, had a good, stiff straw, was hardy and quite free from the ravages of insects, fails to retain those qualities, and forces the farmer to change to some other variety. Even this year many of our best farmers have been trying to obtain something to take the place of the Fultz wheat, once so popular. What an advantage then if an experimental farm could have been located in southwestern Michigan, which could have tested and secured for distribution a variety to take the place of the one now in use, and one which we would have been perfectly safe in adopting, as it would have been grown in a like climate and soil. The request of our agriculturists for appropriations to advance our cause is a wise and very reasonable one. No other nation of prominence is as niggardly in this respect as ours. In 1877, France appropriated for the support of agriculture and commerce, \$20,000,000; Russia, for agriculture and public lands, \$15,000,000; Austria and Hungary, for agriculture alone, \$5,500,000; Great Britain, \$800,000; Sweden, \$650,000; the United States for the same year, only \$174,686. Thus it will be seen, that Russia, our greatest competitor in the markets of the world for agricultural products, spends annually seventy times as much as we do; and little Sweden three times as much as this great nation does for the support of the industry upon which its prosperity and perpetuity depends.

To prove my position and show what can be accomplished by governmental aid, and continued and careful experiments, I have but to call your attention to the history of the beet sugar industry of France, about the middle of the eighteenth century. Marggraf, an apothecary in Berlin drew attention to the sugar contained in beets, but Achard, the Prussian chemist, was the first who was tolerably successful in extracting it. Still, as only two or three per cent of sugar was obtained, the product did not pay the cost. In this extremity the French nation wisely came to the rescue, placed a protective duty on sugar, offered a bonus to those who would engage in the cultivation of the beet, and at once commenced to experiment to overcome the obstacles that confronted them, and did not cease their efforts until they succeeded.

The expense incurred has been amply repaid, as France produces annually about 450,000 tons of beet sugar, or 900,000,000 pounds. Besides the refuse used for provender and the alcohol extracted pays the cost of manufacture and brings to the laborers of France about \$50,000,000 annually. It gives profitable employment to thousands of her subjects, and makes her population largely agricultural. Herein lies her strength and prosperity. It saved the nation from bankruptcy; has enabled them to prosper under the enormous war debt, and to survive the loss of their vineyards, and had as much to do with her becoming a republic as any one cause. There is something in the occupation of the husbandman which creates in the breast of those engaged in it a desire for freedom and a supreme contempt for royalty; and, Mr. Chairman, I have no fears for the perpetuity of our republican institutions as long as agriculture is the principal occupation of our people, as long as it is fostered and encouraged, and the majority of our population own the soil and till it. While this is not a treatise on sugar or its production still I desire to call your attention to its great importance. The consumption of sugar has become enormous. It is estimated that the United States consumes 40 pounds per capita. Making a yearly consumption of 1,000,000 tons, or 2,000,000,000 pounds; nine-tenths of which is imported at a cost of over \$100,000,000, all of which ought to and could be produced at home. It is estimated that two per cent of the acreage devoted to corn would, if cultivated to sugar cane, produce all the

sweets needed in the United States; and a larger per cent would make us large exporters of this great and profitable commodity. Certain difficulties have heretofore prevented the manufacture of sugar from sorghum becoming remunerative, and has deterred many from engaging in its cultivation; thus depriving us of a most profitable industry which would add millions of dollars to our national and individual wealth and diversify production, and thus prevent the over production of the cereals and consequent low prices. Here comes in the necessity for careful, scientific, and extended experiments, which can only be consummated by adopting the remedy suggested in the title of this essay, viz., Experimental Stations. The most active and enterprising of the States are taking the initiative. In reading the address of the Master of the National Grange, the Hon. J. J. Woodman, I see that eight States are reported as having experimental stations, four of which, I am proud to say, have been established through the influence of the Grange, and I quote from it. He says, "The question of establishing these stations in several other States is now being agitated by patrons, and all reliable information in relation to their management, and the results obtained, should be collected and disseminated as widely as possible."

While writing this essay my attention was called to an article in the Michigan Farmer by Prof. Failyure, from which I learned that the first experimental station proper was organized in Germany in the year 1851, and from the establishment of this station dates a new era in the agriculture of Europe. The knowledge of chemistry being so essential to progress in agriculture has placed these stations largely under the control of eminent chemists. The importance of these stations has been so evident, and the results obtained so satisfactory, that in the short period of 32 years there have been established no less than 85 in Germany alone. Other European countries, keenly alive to their interests, and appreciating the advantages to be derived from thoughtful, painstaking experimentation, have established fifty more. They are under the control of the government, and depend on the government for support. Besides, many private enterprises in this direction have been undertaken, through which extensive and valuable contributions to our scientific knowledge of the operations of agriculture have been obtained. Their operations have so far been confined to: 1st, an examination of the quality of seeds and the control of their sale; 2nd, the analysis of commercial fertilizers offered for sale; 3rd, experiments in feeding and with dairy products; 4th, investigation of soils; 5th, experiments with various fertilizers; 6th, the cultivation and improvement of the various crops of the field, orchard, and garden; and their investigations in these directions have led them into almost every feature of agriculture. Notwithstanding the favor with which these stations have been viewed by European governments, our own national and state governments have been slow to engage in them. It would seem that enlightened statesmanship would have early recognized the importance of improvements in agriculture to a people so largely dependent upon it for their welfare. I can only account for this by the fact that as agriculturists we have not had our proportion of representatives in congress or our State legislatures, and as a consequence our interests have not received the consideration their importance demands. They have been neglected and crowded into the background by other interests more largely and better represented, which have had more persistent, clamorous, and active advocates, and if we ever get the recognition we deserve farmers' institutes, farmers' clubs, farmers' organizations of whatever name

and nature, and farmers generally, must make their wants known, and insist upon having them recognized.

Mr. Chairman, ladies and gentleman, much more could be said to prove the necessity for the establishment of experimental stations, but as I remarked in the beginning it is not expected that this essay will embrace all that ought to be said on this subject, but only introduce it, and such, Mr. Chairman, in my feeble way, I have attempted to do. Besides, I am admonished that I am occupying more than my proportion of time in the discussion of this subject. I have no desire to weary you or tax your patience. I thank you for your kind attention.

DISCUSSION.

Hon. Henry Chamberlain said that few comprehended the difficulty of making an accurate experiment. He referred to those of Laws and Gilbert as having extended over a period of thirty years, conducted by scientific men who had both leisure and wealth, yet but few things had been determined. We want, as farmers especially, to know how to make the best of our farms and leave them unexhausted to those who come after us. He said the State Board of Agriculture had some experiments under consideration. In order to make them, money would be necessary; must come from the people and appropriated by the Legislature.

LOSSES AND IMPERFECTIONS ON THE FARM.

BY E. B. HAYES.

[Read at Caro Institute.]

In looking at this evening's programme you will perhaps think that the farm questions have been pretty thoroughly discussed, that there is little left for me to say; and that is about the way I feel over it.

Mr. Rogers has thoroughly drained it; Orr has drawn sketches and held them up to your view, showing how it is on the farm, and how it should be; Selden has given you legislation for the farm; Weaver has stocked it with sheep, and Goodrich stands ready to extract the sugar.

The committee on arrangements seem to have thought it would not be prudent to pull down the bars and turn thoroughbred cattle in with sheep; and this is undoubtedly the reason that Elder Baker comes in where he does with his system on the farm, is to prevent Weaver's sheep from butting thoroughbred cattle and thoroughbred cattle from goring the sheep.

As my subject indicates I will endeavor to point out to you a few losses and imperfections on the farm. That there are a few old ruts that we farmers are running in and making little or no effort to get out, you will not deny. That we cling to old modes of doing our work with more tenacity than men of other professions is equally true.

The doctor of fifty years ago could not practice in Caro now. The lawyer of forty years ago would make a poor showing in this room to-night if court was in session. The preacher of thirty years ago could not palm off on you one of his old sermons—you demand something new. The school teacher of twenty years ago could not enter your school rooms under that name now.

The first loss that I wish to call your attention to is the universal and careless waste of farm food. I believe it to be the greatest one sustained by the farmer, and was in hopes Selden would recommend legislation to prevent it.

You will all agree in this, that oats or its equivalent sustains that noble animal, the horse, while he plows and cultivates your fields. If he is supplied with as much food as is required we find him in as fine condition for work at the end of the season as when he began.

Allow me to contrast the care you bestow upon the food of the horse and the care you give the food of the farm. You watch with eager eye the field of ripening grain, and with almost mathematical precision you put in the reaper. You house and thresh with as much care as you do the food for your own table. You place it inside of strong walls and keep it more secure than the prisoner in our county jail. You deal it out to the horse in as even doses and with as much precision as your doctor does the poison to his suffering patients, and the result is that the horse is kept up in condition to make ample returns for all food consumed.

Having pointed out the usual method of caring for the food of domestic animals, we will now call your attention to the usual treatment of food for the farm. Do not imagine that I intend this for some other locality—I wish it to apply directly to Tuscola county.

Do you see that barn with a manure pile at each end, a short distance from Vassar? Have you ever been by there when they were smoking like coal pits? A short distance from here we find a farmer manufacturing a quantity of number one farm food by feeding young cattle for beef. The food for the cattle is securely kept in the barn, and the food for the farm is chucked out through holes and is being leached under the eaves of the same building. Passing along we come to a fine barn nearly one hundred feet in length. Not only the hay and grain are securely kept but there is a commodious cellar for the safe keeping of vegetables; and where do we find the food for the farm? It is wheeled out into the yard to firefang in a pile, or spread out to be bleached and leached by sun and rain.

If we should continue through our county we would find the farm food in conditions similar to the ones I have described. I think writers on this question generally agree that the liquid portion is about equal to the solid. If this be the case is not the construction of our stable floors such that a large per cent (and nearly all that is in condition to enter the soil as plant food) passes through the floor and is lost under the barn.

Now, gentlemen, isn't this true? How many barns and yards can you show me where this portion of the farmers' bank (I think it should be called national) is not running to waste. In the Farmer's Review of May 11th, 1882, we read that in the Atlantic and Middle States the farmers annually purchase five hundred thousand tons of fertilizers, at a cost of twenty millions of dollars. And why this enormous expense? The soil by nature is good—and by proper treatment should improve, or at least hold its fertility. We venture an answer—that those farms have suffered for years from the same cause that yours are endangered now, from a careless, indifferent treatment of farm food. In short you are contradicting in practice what you advocate in theory.

We have something over three thousand farms in our county, the average being a fraction above eighty acres each. The average number of cattle to each (including cows) is five. The average number of sheep on each farm is

seven. With this small amount of stock are we not suffering a loss as well as following an imperfect mode of farming.

And again, look at our average yield of grain, and tell me, fellow farmers, what is the cause of its running so low? Corn thirty, oats less than thirty-five, and wheat from ten to twenty bushels per acre. If we should double the number of young cattle, thribble the sheep, and make it a point to save all the farm food, (instead of wasting half as we do now), do you not think the yield per acre of your farms would be materially increased. On my way to this place to day I passed a fine farm of nearly two hundred acres, nearly all improved. The stock consists of a small flock of sheep, five cows, and four calves. In the barn-yard and in the field are large straw stacks, their snow capped tops and sides gave to them the appearance of huge monuments erected in memory of good crops of grain that were once grown on this farm, and I believe if this mode of farming is kept up for any great length of time such monuments would be very appropriate.

In contrast I will point you to another farm of one hundred and twenty acres, where about forty head of cattle and nearly twice as many sheep are being kept on grain, straw, and corn fodder raised upon the farm, and the only thing the owner laments over is that he hasn't cattle enough to consume the coarse feed. One of these farms is certainly suffering a loss, and I leave it for you to say which one it is.

A few words now in regard to the care of young stock—and I hope I shall succeed in drawing out discussion. I will again give you a practical demonstration. Last June a farmer sold two calves, eight weeks old, for twenty-one dollars. Last week I saw his neighbor sell two calves, forty weeks old, for sixteen dollars. Was there a loss in either case? And if so which sustained it?

I now come to the last and most unpleasant part of my subject. If I should point out something that you make a specialty of, and carry almost or quite to perfection, you would undoubtedly be pleased over it; but it is not your good qualities that I am aiming at; I am trying to hit you in weak places.

Among the imperfections on the farm, we frequently notice costly farm machinery exposed for months to sun and rain. We occasionally see farm buildings so arranged that it becomes necessary in going back and forth from house to barn, to pass through the yard where stock is kept—this always looks like imperfection. You have undoubtedly seen (if you have not I can show you), fields where flocks of birds alight on the branches of dead weeds, and busy themselves in gathering the seeds that have not fallen to the ground. If the birds had reasoning faculties, and could talk, we presume they would admire and praise such farming. The blackened stalks, surrounded by a mantle of snow, not only gives to the fields an unsightly appearance, but adds imperfection.

We notice the old style of plowing into lands with back-furrows and deep dead-furrows that has been practiced as long as any of you can remember, is still kept up to-day. As you are doing away with surface drains by underdraining, why not keep the surface of your fields even by properly plowing. The ridges and depressions not only make it unpleasant, but is much harder on teams and machinery. I can show you on a farm not many miles from here, underdrained fields, free from all obstructions, that have been plowed in lands east and west for so many years that they look as if they had been prepared for a variety of widths and heights of turnpikes. Pointing to one I asked the owner why he had allowed so fine a field to get in so bad a shape.

He replied that he had not noticed that it was so bad, or even thought as it could be plowed to prevent it.

We have been called here for the purpose of exchanging ideas—assembled for the special benefit of those engaged in agriculture—here for the purpose of talking. Some of you will give us your ideas this evening, others will sit here, loaded perhaps to the muzzle, but will not fire till we meet you on the street or at your homes. If I have made any mistakes, or misstatements, have said anything that does not coincide with your views, I hope you will not be backward or bashful, but jump up and punch holes in my paper.

HORSE RACING AT AGRICULTURAL FAIRS.

BY P. C. PURDY.

[Read at Caro Institute.]

While I am of the opinion that “trials of speed” are all right and proper in their appropriate places, still I think they should not monopolize the greatest share of the time nor be the prominent feature at our fairs. Formerly the trials of speed—now really the race track—were merely an incident, a sort of tail-piece to the general exhibit of agricultural and horticultural products, implements and modes of culture, and of generally useful domestic animals. Latterly the tail seems to wag the whole body, and the largest premiums and most attentions are paid to trotting and running horses. Thus we see premiums offered in the premium list something like the following: Horses for all work, single mare or gelding, 4 years old or over, first premium, \$3; second premium, \$2. While in race No. 6, open to all: first premium, \$35; second premium, \$25; third premium, \$15. The poorest race horse gets five times the amount which the best horse for the farmer gets.

Comparatively few of the public spirited men who get up and manage the fairs fully approve of this feature, but deem it a necessary evil. The executive committee reason that while the body of staid old farmers will come for the sake of the real object of such fairs, the trials of speed attract a large floating population, who care not a fig for agriculture, but whose admission fees supply the sinews of war.

That the fairs in many parts of the country are deteriorating is certain. Not a few of the best farmers are questioning whether fairs are on the whole useful. There are certainly a good many who are disgusted with the growing influence of the race track, and are unwilling to bring their families under such influence. If all of this class are alienated will not our fairs soon become little more than an annual race course. There are many instances which it might be well to consider in this connection. The Orange county, N. Y., agricultural society not long ago, says an eastern paper, fearing the race track would get the supremacy, abolished speed premiums. Many predicted failure, but the results last year and the year before show the contrary. Instead of the race all the exhibited animals were marshalled in grand cavalcade each afternoon, and, preceded by a band of music, marched in classes following each other around the track and in view of all present.

The quiet, earnest attention and study to be seen in the faces of from ten to fifteen thousand lookers on were indications of far more practical information carried home than could have been derived from seeing a few fleet-footed animals dash past at their utmost speed under the lash of professional jockeys.

In speaking of the Nebraska state fair held this last year, one writer says: "It was one of the most successful in the history of the state, and this fair was notable for the little interest taken in the races. At no time was the race track made the center of attraction for more than a small fraction of the crowd present.

The agricultural society of this county, while they held their exhibitions at Watrousville, (as we all know) has persistently set its face against the introduction of this feature, and very few, if any society in the State has more prosperously gone forward with grand agricultural exhibitions every year, never in financial straits, but always making a large, useful, instructive, genuine, agricultural show. It would seem that the races are not a necessity, why then should they be encouraged at the fairs. They surely are not an ornament.

Neighbor farmers, don't imagine you would make a very graceful appearance seated on a red trotting sulky, holding the ribbons Budd Doble style, dressed in a blue flannel shirt, white knee-briches, and skull cap, driving at a 2:40 gait. You would make a far better appearance driving a good, solid, fat span of farm horses, even though they may be hitched to a lumber wagon. We have all known farmers to succeed by attending strictly to agricultural affairs. But did you ever know one to get rich driving fast horses?

MIXED HUSBANDRY.

BY A. D. SAXTON.

[Read at Eaton Rapids Institute.]

MR. PRESIDENT, LADIES AND GENTLEMEN,—The subject assigned me is one of considerable interest to the farmer. I do not expect to say anything that will be new to you, but perhaps it may draw out thought and discussion for our mutual benefit. The profits that are derived from mixed husbandry depend a great deal upon circumstances, upon soil, climate, etc.; but in this part of the State, as a rule, it needs no argument. I think it is self-evident, to the observing farmer at least, that mixed husbandry pays the best. It should be as diversified as possible; in fact, I don't see how any farmer can succeed, or how he can farm with any degree of success, without raising different kinds of crops and some stock. The time has been perhaps when the raising of wheat, and that alone, was as profitable as anything the farmer could engage in when the country was newer, when the soil was rich in wheat producing properties, and when wheat brought a good price in market; but that time has past I think in this part of our State. But even when wheat raising paid the best, the farmers that were the most successful were the ones that raised the most clover to plow under and kept some stock to eat up the coarse fodder. Take the farmer, for instance, with 80 or 100 acres of land; he says to himself, there is money for me in raising wheat than anything else. He goes to work

with all his might and strength; he is persevering and untiring in his efforts to get as much of his farm into wheat as possible; he works early and late; keeps a hired man, two teams, and sows from 40 to 70 acres of wheat; he puts a great deal of time and money into his crop, *which is to be*; he harvests, threshes, and what is the result. It has been one continual outgo all the time until he gets his crop ready for market. Perhaps has had to hire money to pay for help, seed, and feed for teams, expecting his crop would pay all and leave him a handsome profit besides; and perhaps it would with a good crop and a fair market. But, on the contrary, suppose his crop is a failure, or partially so, which is very often the case, the market low, his time and money has been thrown away besides impoverishing his soil. This is no idle fancy, it is what we have all seen, not only in wheat raising but in other crops when they have been made a specialty.

Mr. President, I believe that experience is the best teacher by all odds that farmers can have. We can learn useful lessons from our own experience and from our neighbors. We should not be satisfied with old methods if there is anything better; and by continual experimenting, careful observation of different methods and kinds of crops we learn what is practical and beneficial. The greatest benefits to be derived, the most money to be made in farming, depend upon certain conditions. It depends in a great measure upon the kind of farm you have, whether it is by nature a grain or grass farm. On a farm that is naturally low and wet, which produces grass abundantly, and one that is not adapted to grain, raising stock would be the only thing to engage in profitably, and at the present prices of stock I believe that more money could be made and made easier than on a grain farm; and on such a farm mixed husbandry would be out of the question at any great extent. But we have very few such farms as I have described. Most of our farms produce grain as well as grass, and we have a chance to diversify our crops as much as we like. One of the greatest benefits to be derived from mixed husbandry is the different funds we have to draw upon during the year, which is very convenient, to say the least, where we have no bank account, which I venture to say most farmers have not. In the winter we have some fat steers or wethers perhaps we have been feeding to sell. Then comes our wool, which is no small item. Then after shearing some more sheep and lambs to sell. Then comes our surplus wheat and oats. Later on comes our hogs that we have to sell off from our stubble, and a thousand and one other things too numerous to mention which every good farmer that practices mixed farming has to sell at different times all through the year.

The raising of various kinds of grain and stock are essentially blended in farm economy. It would be very unwise to separate them. We have a good grain growing State; it is conceded to be one of the best in the Union for its fine quality of wheat, one of the very best in its fine horses, second to none in its fine flocks of sheep, and hard to beat in thoroughbred cattle and hogs. In any mode of farming there are two important questions the intelligent farmer will ever keep in mind, namely: The maintaining the fertility of the soil, and that mode of farming that will give him the greatest income with the least expense in labor and money. To maintain the two there are many reasons in favor of mixed husbandry and there can be no general failure because if one crop fails others are maturing at different seasons that are not likely to fail. A rotation of crops on certain soils at least seems better for keeping up the fertility of the farm than to continue it in certain special crops. The producing qualities of our soil, its fertility, is what we should look after all the time, and our constant aim and study should be to feed our soil with food that will

make it grow better and better and at the same time give forth large returns in its abundant crops. I believe in mixed husbandry because it is the only practical way of keeping up the fertility of our farms. If our farms are allowed to get poorer instead of better, it is only a question of time when they will fail to support us, "as some one has said." What would you think of the wisdom of the man having say \$4,000 at interest, who in addition to using the interest yearly should also use a portion of the principal? You would say at once he will soon have neither interest or principal, he will be bankrupt.

A farmer has a farm worth \$4,000; that farm is his principal, the producing power of his farm is his interest. As the person having the money at interest will become bankrupt if he persists in using a part of his principal yearly besides his interest, just so surely will the farmer become bankrupt if he allows the producing power of his farm to become impaired. The analogy between the capitalist and the farmer is in this respect perfect. This is not a fanciful idea or overdrawn picture.

The Commissioner of Agriculture of the United States, in one of his annual reports, says: In some of the New England States thousands of acres have been literally abandoned and are lying untilled and unoccupied. These lands were once occupied by an enterprising and industrious people. The same is true of large tracts of lands in some of the Southern States; lands that are completely worn out, starved to death, as it were, by one single line of farming, by not giving back to the soil what justly belonged to it. I know of farms, not a great many miles from here, that are about in as bad condition as those above described. There can be no certain rules for rotation of crops, or the amount or kind of stock to be kept. Every one must decide for himself the rotation of crops best suited to his farm and the amount and kind of stock that he can keep at the best advantage and most profit. That depends a good deal upon the kind of farm, whether it is high and rolling or low and flat. Sheep will do a great deal better on a high, rolling farm than on a low, wet, flat farm. On most of our farms I think it advisable to diversify our stock as well as our crops, and what we keep be sure and have good breeds. We cannot afford to keep any other. It costs no more to keep a good grade of any kind than it does to keep a scrubby native, and with the same feed the grade will sell for almost double, and whatever we keep should be well fed. If we are to receive any profit from the stock we keep on the farm, it is by keeping it growing until it is ready to sell. It takes but little more feed to keep a pig, a calf or colt growing and in good condition until they come to maturity or until they are ready for market, than it does to just keep them alive and in a stunted condition. In the one case, you throw away your feed and time; in the other, you realize a profit.

A great mistake with farmers, I think, is plowing too much; the more we plow the more hard work we have to do. The more hay and grass we raise the more stock we can keep, thereby having more butter, more cheese, more wool, more mutton, more beef, more pork, and a larger and better manure pile, which again will give us more hay and grass. The farmer that follows mixed husbandry is more sure to succeed, for if he fails on one crop, or kind, he is sure to hit the market on something else. Besides he doesn't need so much help, he has more time to put in and gather his crops, for the reason they mature at different seasons of the year, and would not have so many acres of each kind to harvest.

Now to substantiate my theory that mixed husbandry is the most profitable, I will ask you to look around among the best farmers, those that have been the most successful, the farms that are under the best state of cultivation, and I think you will find them owned and managed almost invariably by farmers that are engaged in mixed husbandry. In addition to growing grain and stock, every farmer should raise fruit, and that too should be diversified. He will, of course have a good apple orchard, and peaches, and pears, and in addition should have plenty of small fruit, not only for convenience and profit, but they are a great luxury, all that is needed to have them is a little time and care. I have only outlined the principles of mixed husbandry, it only remains for us, the tillers of the soil, to prosecute it intelligently and reap its rewards.

CONSTRUCTION OF DRAINS—GENERAL EFFECTS.

BY PROF. R. C. CARPENTER.

While it is unquestionably true that drains greatly benefit flat, heavy land, or land that is continually wet, it is not so generally admitted that they are also of great benefit on lands wet only occasionally, and having a surface somewhat or considerably rolling. It is a fact, however, that heavy clay lands are greatly benefitted by drainage, even if naturally dry and having a rolling surface. In the first place, drained lands are much warmer than wet lands, for this reason: The evaporation in the drying up of water requires heat, and the total amount of heat required is the same whether the evaporation be done in one day or in several weeks. Some portion of this heat is likely to be drawn from the earth, leaving it colder than before the water was dried off or evaporated; on the other hand, when under-drains are used, the water passing from the surface downward through the soil, if warmer than the soil, gives up some of its heat, and the land is much the gainer. Thus drainage gives us, to a certain extent, control over the climate. Under-drains are of much benefit in aerating the soil, and rendering it more porous. During dry weather the underdrains serve as channels for the air to pour into and through the soil, and serve in this way to drain into the soil the moisture contained in the atmosphere. All know that during dry seasons the positions of the under-drains are clearly marked by the greater growth and freshness of the vegetation immediately over them. Thus they serve to lessen the evil effects of excessive wet as well as of parching drought.

The benefits of drainage in giving us better health and longer lives is well attested by actual observation. The water that will be carried off by drainage is only that which is in excess of the needs of plant life, and is that which is so potent in breeding malarial diseases, and bringing death and the blackest of all sorrow to many happy homes. The victims of undrained areas either lie beneath the earth, or drag half dead bodies for years over it.

Under-drains are also of benefit in increasing the action of the fertilizers. Surface drainage is always detrimental in this respect, as the fertilizers are carried by the wash into ditches and water-courses, where they cannot possibly do any good. On the other hand, with a good system of under-drains, the water, instead of running over the soil, runs through it, leaving therein a

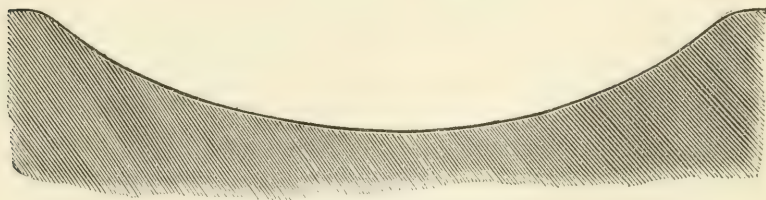
great portion, if not all, of its fertilizing materials. But the principal objects of this paper is to tell "how to drain," rather than to argue the benefits of drainage. There are two classes of drains, one the open ditch or trench, and the other the closed or under-drain.

The drainage law of the State of Michigan makes provision for the compulsory construction of drains when a majority of those interested desire it. Legal safeguards are erected for individual rights in the forms and petitions that must be secured and posted as the law directs. Frivolous but legal technicalities have in some instances been allowed to overthrow the operation of this law. The law itself has a clause tending to nullify the captious opposition of dishonest attorneys, yet, despite that, in some counties the attorney fees have amounted to more than all other charges together, and even then some illegality would take away the power of collecting the cost by taxation of those benefited.

My own opinion is that the remedy is not to be found in any amendment of the law, but rather in the election of intelligent drain commissioners. The law at present is as simple as it well can be and guard individual rights. Some essential conditions are required, and these conditions are all reasonable and necessary. In the first place those desiring the drain are to petition the drainage commissioner. He is to examine the land, and if he thinks it feasible he is to have a survey. As a description of the ditch is required in the first petition to the drain commissioner it is safer to have that resigned after a surveyor has located the ditch. Then the commissioner should proceed as required by the law. If his work is done intelligently and justly it is hardly possible to be overthrown by the worst shyster lawyer in the state.

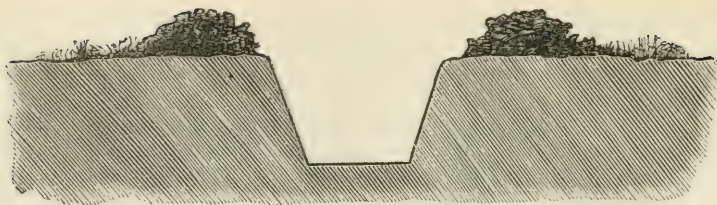
In most countries this law has given satisfactory results in its operation, and although at times there may have been made unjust assessments and hard feelings, yet on the whole it has done more to improve the health and prosperity of our people than any single law ever before passed. By its help large marshes have been drained, lakes have been lowered, and immense tracts of unhealthy, disease-breeding swamp converted into excellent meadows, or in some cases into arable land.

CONSTRUCTION.



No. 1. Proper form for open ditches.

The open ditches constructed under authority are to be dug as the officer in charge requires, but usually they have a width on the bottom depending on the area to be drained, and a uniform slope to the sides of 45°, or one foot horizontal to one foot in depth,—a slope somewhat flatter would no doubt be better. The standard railroad slope of 1½ feet horizontal to one in depth would be none too much to secure permanency of the drain. It would however be more difficult to construct in boggy or grassy ground.



No. 2. Improper form for open ditches.

When the ground will admit the use of teams, open ditches can be constructed very cheaply, and given a very flat slope, with the plow and scraper. The practice of leaving the waste earth close to the banks of open ditches is a very pernicious one. This earth should be thrown well back from the ditch, and so leveled off or distributed as not to prevent the surface water from reaching the ditch. If it is left on the bank of the ditch its weight tends to cave the ditch in, it is also liable to be worked in by rains.

The construction of open ditches is less affected by variations from grade than a line of tile under-drains since the ditch is permanently open, obstructions to the flow of water can be seen and removed at any time. In practical work of construction, it has been found that good results are secured if stakes showing the depth are placed only once in twenty rods. In long lines of open ditches it is essential that a level of the line be taken, as in most cases the fall that can be secured is slight. This level is required in all town or county drains.

LEAST FALL ON OPEN DRAINS.

The least fall of large bodies of flowing water may be very small indeed. The average fall for the Amazon river is only six inches per mile. The average fall of the Lower Nile, seven inches per mile; the Lower Ganges, four inches; the average for the whole Mississippi, seventeen inches, below Cairo, twenty-eight inches; the Ohio, six inches. The Rhine is the most rapid large river in the world, its fall from Geneva to Lyon being eighty inches per mile, and from Lyon to its mouth, thirty-two inches per mile.

The flow of water, or strength of current, depends as well upon the volume and depth, as upon the slope. This fact has probably been noticed by all, that the flow through the same stream is much stronger at times of high water or freshets, than at low water. From observation of the action of the laws of nature in rivers, much can be learned in regard to the form and slope of open ditches.

From the fact that the strength of current depends upon the volume as well as the depth, this general law is observed, that the larger the drain the smaller the grade necessary to secure efficient working. The even, regular banks and direct course are also of advantage to the artificial, as compared with the natural stream. The least slope for ditches three or four feet wide across the bottom, should not average less than one foot per mile, although occasional stretches may be much less, provided a good body of water is flowing. Changes in the grade line, however, should be as slight as possible, otherwise material taken up by the water where the current is strong, will be deposited where it is slack. The action of a stream, itself, tends to a uniform grade line. There is also a maximum fall as well as a least fall. It is evident that the current should not be so great as to corrode and eat away the banks.

The open ditch serves its purpose completely as an outlet for large swamps

and lakes, or underdrains, in fact, as an artificial water course of too great a size to be carried under ground with the means at present at our command. Its use is never to be commended when an underground drain can be substituted. It is open to the objections of being but a temporary construction, dangerous and inconvenient to cross, usurping valuable land, inefficient in its action, as the water reaches it rather by washing in at the surface than by percolation.

The open ditch has its part to play in the drainage works of a country, and in many places can never be replaced by the underdrain. It is, however, at best, a temporary construction, unless a heavy body of water flows through it; for every rain carries particles from its banks to its bottom, and every winter's frost exerts its power to fill it up, so that the construction of an open drain implies a continual bill for annual repairs, or else a gradual lessening of its efficiency.

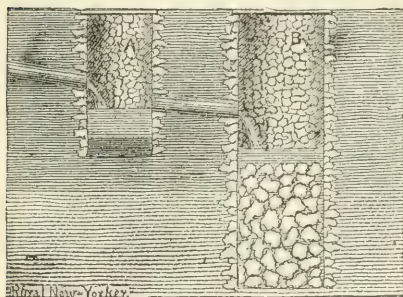
THE UNDER-DRAIN.

Under-drains are the only ones that can in any way be considered as permanent, and these are not permanent unless properly constructed.

The outlet must be the first consideration in locating under-drains. It must be sufficiently low to allow a free flow of water from the drains. It is often a difficult thing to secure a good outlet, especially in a low, flat country, but it must be done before any successful drainage system can be carried out. The construction of township and county ditches has often to be resorted to before good outlets for tile drains can be secured.

DRAINAGE BY WELLS.

In several instances outlets have been obtained by digging large wells until water-taking strata are found, as shown in Fig. 3. As the construction of these wells forms an important method in drainage, and as I have much faith in their efficiency in many localities, I take time to describe in detail the method of constructing them.



Drain-well. Fig. 3.

Since, in order to be successful, water-taking strata must be found, this system is somewhat uncertain in its operation. There is no doubt that, in certain localities, water-taking strata are not to be found, or lie so deep as to render the sinking of wells to them impracticable. This uncertainty has, of late years, rendered this method of obtaining an outlet so unpopular that in practice it has seemed likely to be lost sight of. It has, however, been tried with success in Michigan, at Marshall, near Lake Superior, and in several other places on a small scale, and I have not heard of any trials in this State being unsuccessful.

This system is so inexpensive when it will work, that I would advocate its trial in the drainage of all large swamps where an open outlet cannot readily be obtained. The water-taking strata are usually of coarse sand or gravel, or sand and gravel combined. By driving a capped two-inch gas-pipe down a few feet at a time and withdrawing it, the character of the successive strata of earth can be accurately determined with little expense. The water-taking character

of the strata can be tested by pouring water down the pipe. The size of the well will depend on the area to be drained. It will probably be better to construct as many wells as may be needed, each with an internal diameter of six or eight feet, rather than try to make fewer wells of larger size. If the strata take water with great avidity, a two-inch drive-well might answer; but from considerations to be mentioned further on, such wells are not likely to be permanent.

How Constructed.

In the construction of these wells, certain important considerations are to be taken into account: First the well must have as large an area as possible in contact with the water-taking strata; second the water that enters the well must be as pure as possible. The first condition is secured by sinking a large well so deep into the strata that water will escape from the sides as well as from the bottom. The second condition is important, because the drainage water from all land, and especially from marshes, holds in suspension a fine dirt, termed silt, which is deposited when the water comes to a rest, covering everything with a crust which would, in time, choke up the best drainage well ever made. We can prevent this dirt from getting into the well by the construction of settling or silt basins, which first receive the water and discharge it into the main well. The important thing in the construction of these silt basins is to make them large enough to hold considerable water, and to have the outlet of the outgoing pipe its diameter below that of the outlet of the incoming pipe. These settling basins may also receive the surface water. The construction is shown in Fig. 176, in which A is the settling basin and B the main drainage well.



Outlet of drain, Fig. 4. feet below the tile coming in.

More than one settling basin might be constructed on different sides of the well, if necessary. I would make the settling basin four feet in diameter, with a depth of three feet.

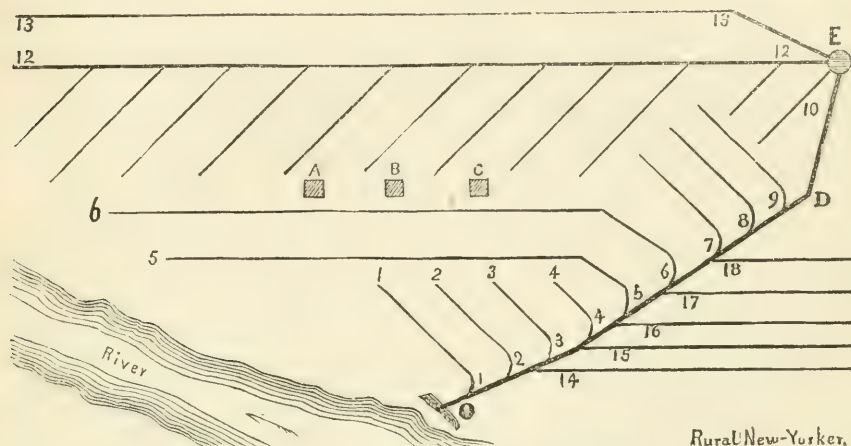
The main drainage well should probably be filled with large, loose stones at least to the height of the drain. However well drainage wells might answer, they can never be superior to a free outlet.

Protection to outlets.

The outlet to under-drains should be protected by some construction, as shown in Fig. 4, that will prevent the earth from falling in front of the drain. The best construction is a retaining wall of masonry laid in hydraulic cement. There should also be a coarse grating in front of a tile drain to prevent vermin from getting in. Coons, muskrats, and rats have been known to run up tile drains as far as they could go, and finally get lodged, and form an obstruction to the flow of water. The outlets should be free; that is, above the surface of still water, as standing water in a drain is liable to cause a deposit of silt. Common porous tiles should never be used for an outlet, as they are destroyed by freezing when wet. For the 16 feet nearest the outlet, either glazed tile or a triangular or diamond-shaped box of wood should be used. In nearly every kiln there are a few tiles burned so badly as to be in part vitrified. Such tiles, if of good shape and full size, would answer for outlet tiles.

THE LOCATION OF DRAINS.

So far as possible, drains should be located in such a manner that the water will flow with greatest velocity, provided, of course, the velocity is not so great as to injure the stability of the drain; this, I think, practically never happens. The greater the velocity the smaller the size of the pipe needed, and the less the cost of the work. The application of this rule would require the drains to run directly down all slopes, and that is about the only important principle to be borne in mind in locating drains, and should be applied whenever applicable. As an illustration I refer to Fig. 5, which is a sketch map not drawn to scale, of the drains actually constructed in the west part of the grounds of



PLAN OF LOCATING DRAINS. FIG. 5.

the Agricultural College at Lansing, Mich. The outlet is protected by a stone wall at O, the main drain of four-inch tile passes up the valley, changing direction with it to E, a distance of 33 rods, having an average fall of two inches per rod. At this point the contour of the ground required an abrupt bend, and a silt basin, the construction of which will be described further on, was sunk at this point, principally to lessen friction from the abrupt bend, also to allow the workings of the drain to be examined, and retain silt from drains 12 and 13. From the silt basin a sub-main, marked 12 in the cut, was run, which received a number of laterals making an angle of forty-five degrees with the main, each terminating at the summit of the ridge.

From the main O D, a series of laterals, marked, 1, 2, 3, 4, etc., were run directly up the slope; the angles made with the main drain being likely to make back currents, they were connected with the main by curves, as shown in the plan. Between drains 5 and the ends of 1, 2, 3, and 4 was a terrace, which it was impossible to pass through, and drains 5 and 6 were put in running diagonally down the slope. The sizes of the tiles used were, for main drain, four-inch; for drain No. 12, three-inch; for lower part of 13, three-inch; for the remainder of the drains, two-inch; area drained about twelve acres. The fall of the drain marked 12 was two inches per rod. The fall of the short laterals was often as much as four to six inches per rod. The foregoing example was chosen, not for its perfectness of detail, but as one which, although on

a small scale, would show the advantages and disadvantages of applying our principle of location.

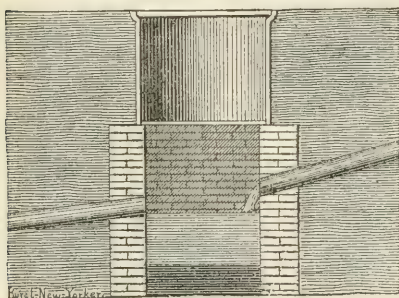
Drains should run directly down the slope. Thus in Fig. 5, drains marked 1, 2, 3, and 4 run directly down the slope; each has then the maximum fall to be obtained on that ground; that is, they strike the main drain at a point near the outlet and are short as compared with drains marked 5 and 6.

Again, drain 5, being on lower ground than 6, receives water principally from one side, viz.: toward 6; on the other hand, each of the drains 1, 2, 3, and 4 receives water equally from both sides, consequently the water has to travel through the ground nearly twice as far, on the average, to reach drains 5 and 6 as to reach drains 1, 2, 3, and 4.

The actual locating of a drain can usually be done more accurately by working from the outlet towards the source, as the eye can estimate a small rise better than a corresponding fall. Again, in the progress of leveling, the calculations are more simple in running up hill than down; for that reason all directions given here are, that we start at the outlet and work toward the source. If work is done in the reverse direction, it will be easy to change the application of what is stated here. The convenience or accuracy of either depends largely on habit, and it is not essential which end is the starting point. The general direction for laying out a system of drains would be to start, at the outlet, run as directly as possible up the drainage valley of the area to be drained; when necessary, run in branches, which shall make as small an angle as possible with the main; if the general direction of the branch differs more than sixty degrees from the main, it should be connected with a curve. If the two streams, from branch and main drain, join at a large angle, they will oppose each other very much in their flow, and a bar or obstruction is likely to be formed across the smaller stream; if they have the same general direction before uniting, one current will accelerate the other. To secure the most efficient drainage with the least expenditure, the final laterals should be parallel with each other. This will frequently require some drains to be run diagonally down the slope. The person locating the drains will have to decide which principle should be sacrificed to give the best results.

SILT BASIN.

To prevent loss of velocity, and also to keep the main drain clear, a silt basin was constructed, as shown in Fig. 6. It was made as follows: Depth below main drain, 12 inches; diameter, 12 inches; main drain, 4 inches below the laterals. Its full depth was five feet; the lower three feet were constructed of brick, laid in cement mortar, laid square 12 inches in the clear.



Silt Basin. Fig. 6.

On the top of the brick-work was a 12-inch sewer-pipe placed socket upwards; a cover was provided slipping inside the sewer-pipe and resting on the brick, another resting in the socket of the sewer-pipe. The construction of the silt basin is shown clearly in Fig. 6. The original object of a silt basin was to afford a place for deposit of silt gathered in the drains above it; this cannot be effectually done unless the silt basin is deeper than the outlet drain; and a break in the current is produced by having the outlet drains on

a lower level than the inlet drains. The silt can be removed by dippers. It is my opinion that, so far as the deposit of silt is concerned, the silt basins are of little practical value. If the main is properly proportioned, any silt that passes through the laterals, will readily pass through that, and reach the outlet. Silt basins have an important office, however, viz.: that of affording a means of ascertaining the working of the drains, and consequently giving valuable information.

Silt basins may be constructed of stone or brick entirely, and of any dimensions needed for especial cases. If designed only as peep-holes, it is not necessary to excavate below the main drain, or even to make a break in the grade of the drains. Covers should always be provided, to prevent the frost reaching the drains.

SIZE OF TILE.

One of the important considerations to be decided is the size of the tile to be used. Economy requires that small tile as will answer be employed, while other considerations imperatively demand that the tile be not too small. The important thing is to get just the correct size. There are many circumstances which effect the carrying capacity of tiles, such as the fall, area of cross-section, length, directness, and smoothness of bore. Directness makes more difference than many imagine. Thus, if resistance in a straight line be ninety, on a true curve it will be one hundred, and be increased by a right angle to one hundred and forty. The friction in tiles is proportionately less in large than small tiles; if this were not so then the capacity would vary as the square of the diameter, and a two-inch tile would carry one-fourth as much water as a four-inch tile; but as an actual fact, it will carry only about one-sixth as much, while a ten-inch tile has about ten times the capacity of a four-inch tile. The variation of tile up or down from the grade line has much to do with its capacity; a line of tile with open joints at each foot, is never under the same pressure as a perfectly tight pipe having the same fall. When the ground above it is saturated with water, the current may be urged on by some head, but since the joints are open, it is evident that the pressure on the water on the inside of the tile cannot rise much above the pressure on the water in the soil outside the tile. If this were not true, the water would flow out from the tile at each joint, and as the area of a limited number of joint openings soon equals the capacity of the tile, the tile would empty itself. This may take place under some circumstances until the pressure is equal, both inside and out; but in any event, the pressure on water flowing through a line of tile drain can never exceed that due to a depth of water equal to or less than the depth of the drain at any given place. Usually there is no pressure urging the water onward except that due to gravity, which depends only on the fall of the drain. This pressure, or force, acting constantly, would make the water flow, like a ball rolling down hill, faster and faster. Were it not for the continual resistance caused by the rubbing of the water against the sides of the tile, and by irregularities and bends in the pipe its velocity would be excessive. This rubbing, or friction, is very great, and may almost entirely destroy the current in small pipes of great length, so that pipes on a given grade, and of a given size, should not exceed certain lengths.

PROPORTIONING OF TILES FOR A LONG DRAIN.

This subject is an interesting one, from the fact that opposite views are said to be held. It was stated at the 1884 meeting of the Michigan Tile Drainage

Association that a philosopher in Ohio had found that the size of tiles should decrease as we near the outlet. His method of reasoning was doubtless as follows: for instance, he has noticed that if a long line of six-inch tile be simply filled at the upper end, in a short distance it is not filled, and if it is long enough and not receiving water throughout its length, the stream becomes less and less, and finally could be contained in a five-inch, and then in a four-inch, and then in a three-inch tile. If a mile long its discharge is only seven per cent of what would pass through the first tile under the same head, and the remedy proposed was to make the tile decrease in size just as fast as the stream decreased, so as to have every tile full.

Had he considered that the true cause of the decrease of the stream was friction, and that could this be entirely eliminated there would be no decrease, his reasoning would have brought a different result. The friction is more in small tile, in proportion to capacity, than in large tile, and the change proposed would simply add obstructions to those already existing in the pipe. While it is impossible to make a long line of tile run full at the outlet without some considerable head, because of this friction, still the aim should be rather to construct the drain so as to discharge what passes through the first tile than to make the outlet tile run full. To do even this will require tiles which continually increase as the outlet is approached.

The following table shows the effect of increasing the length of a pipe. If the discharge through a pipe one foot long be called 1,000, the discharge through a pipe one mile long would be shown by the following table:

Diameter of pipe in inches.	Amount discharged by pipe one mile long on supposition that pipe one foot long same size and head discharges 1,000 cubic feet.
1-----	32 cubic feet-----
2-----	39 " "-----
3-----	46 " "-----
4-----	56 " "-----
5-----	69 " "-----
6-----	73 " "-----
8-----	78 " "-----
10-----	87 " "-----
12-----	96 " "-----
18-----	117 " "-----

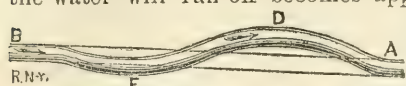
REMARK—This pipe would answer this condition when laid on a level and fed by a steady pressure. When laid on an incline there would be a continual increase of head, and consequently the effect of friction would be less.

The amount discharged is seen, by above table, to vary from three per cent with the one inch pipe, to 12 per cent nearly with the 18 inch pipe. The friction holds back in the first case 97 per cent of the water received, and in the latter case 88 per cent. The formula for the flow of water through pipes is obtained by comparing with the actual flow, the one most commonly used and giving results very close to the observed ones; the velocity in feet per second equals 50 times the square root of the diameter, multiplied by the head and

divided by the length plus 50 diameters, as follows: $v=50 \sqrt{\frac{d \times h}{l+50d}}$, in which

v =velocity; d =diameter; a =total head or fall; l =length. The volume is found by multiplying the area of the stream issuing by the velocity. This formula is seen to approximately vary inversely as the square root of the length. The velocity of water is not sensibly affected by the nature of the pipe, provided it is smooth.

Since a line of tile cannot be placed under pressure of a head except when the soil is saturated, the necessity of having every inch of the tile so laid that the water will run off becomes apparent. Thus in fig. 7 A. D. E. B. repre-



Section Tile Drain. Fig 7.

sent a line of badly laid tile, the true grade being from A. to B. Such a drain may work quite well when the ground is full of water, the pressure above carrying the current through the depression; but as the ground grows dry the current becomes less strong; sand or silt is deposited in the depression, and in time, be it longer or shorter, the tile will surely be filled to the grade line A. B.

I had some experience with a drain of exactly that nature; it was built of three-inch tile through a very wet place, in 1874, and in 1880 it had become completely choked. Digging down, we found the tile as shown by the crook A, D, E, B. There is no doubt that the tiles had always been as we found them, yet the drains worked efficiently, or at least kept the water down, for six years; but when we opened them, the sand was packed firmly clear to the grade line, filling eight tiles completely full. This may explain why drains that often give good satisfaction for several years, finally clog up and fail. Nothing is more permanent than a tile drain properly laid. [I will except peat soil from the above statement, as that frequently settles when the water is drawn off, carrying the tile with it]. When such an event happens with a line of tile laid by a farmer, he is likely to ascribe the failure to the tile, and is ready to condemn the tile furnished by a certain manufacturer, or else the whole system of tile drainage.

Besides the ability of the tile to carry off water, we must know the amount of water to be carried off before we can determine the capacity of given sized drains. The water comes principally from the rainfall—all primarily from that—but we will put it from rainfall and springs. No rules can be laid down for the size of pipes that will drain springs; each case would have to be taken by itself. The rain fall in this part of our country is to be taken into consideration; its amount is about 30 inches per year. That amount would be, for 100 days, only three-tenths of an inch per day, and at first glance it might seem that if the drains were large enough to remove from each acre that amount, they would answer very nicely. A study of the meteorological records, however, gives one a different opinion. Then it is seen that about 50 per cent of our rain, falls in heavy showers, amounting to an inch in 24 hours. During each year we have three or four showers that bring from two to three inches of rain within 24 hours. The soil itself is a great retainer of this moisture, dry sand holding 25 per cent, loamy soil 40 per cent, clay loam 50 per cent, and pure clay 70 per cent of its weight, that cannot be drained off. If the soil was already very wet a greater proportion of a rain would pass into the tiles, than if dry.

Experiments made with a Lysimeter by Lawes and Gilbert, of England, showed that the drainage in summer varied from 7.9 per cent to 47.6 per cent of the rain fall; and in winter from 39.8 per cent to 80.1 per cent. Drains at a depth of 20 inches carried away 44.6 per cent of the rainfall, at a depth of 40 inches 47.4 per cent, and at a depth of 60 inches 42.1 per cent. Dr. Sturtevant, at Boston, found the percentage of the drainage water to rainfall at a depth of three feet to be as follows, for the years 1876, 1877, 1878, and 1879:

Months.	Per Cent of Drainage to Rain-Fall.
January, February, March, April.....	16.5 per cent.
May, June, July, August.....	4.3 per cent.
September, October, November, December.....	26.2 per cent.

Mr. Dickinson, of England, found that the discharge, as compared with the rainfall, was, from October to March, 75 per cent; from April to September, eight per cent; average 41.5 per cent. Mr. Tracy, of Boston, concluded that it varied from 44 to 45 per cent. Experience seems to show that if drains be made of a capacity sufficient to convey off half an inch of rainfall each day of twenty-four hours, they will give excellent results in practice, and it has also been shown that if sizes much smaller be used, the results are not satisfactory. To use larger tiles than such as are necessary, is extravagant; tiles should also run full at certain times in the year, in order to be flushed out. The following table for sizes of tile is very carefully computed, each acre being considered the equivalent to 1,815 cubic feet of water, which is an amount just sufficient to cover one acre with water half an inch in depth. This amount would weigh about $47\frac{1}{2}$ tons; consequently a system of tile drains would have a carrying capacity of 4,750 tons for each acre drained for each one hundred days. As regards the use of the table for the capacity of drains, I would say that no doubt in many cases, smaller tiles than the sizes indicated by the table would answer, for the reason that only a system of random or casual drainage is intended. The table will answer for thorough drainage in regions where the rainfall is no greater than in southern Michigan, and thorough drainage indicates at least the conveying off of the water within twenty-four hours. If only a few drains are used, the water would be longer in reaching the drains, and consequently more acres could be cared for. The probability is, however, that at some time thorough drainage will be required on the land, and as the digging is the most expensive part of drainage, tile large enough for thorough drainage had better be put in, and a permanent job completed, as far as may be, rather than to do what must be done over again.

As regards the practice of tile-laying, I would say, that both in this country and in England, it is customary to lay larger tile than formerly. In England tiles as small as one inch have been largely used, and are still used to a considerable extent, while $2\frac{3}{4}$ and three-inch are considered quite large tile. In this country there is a growing prejudice against the use of tile smaller than three-inches, and the majority of tile-makers are not making smaller sizes. In my opinion, this prejudice against smaller tile is unreasonable, and due principally to the fact that drains of small tile, if carelessly laid, are more likely to fail than larger ones. Thus, for example, a variation of two inches from the grade line would, in time, be fatal to a two-inch drain, whereas, it would only partially choke up a three-inch drain.

The reason two-inch pipes have failed utterly is, no doubt, due to careless construction. I claim that there are many places in a system of drainage when these tiles, properly laid, will answer every purpose. I know that a few years ago, expectations, that were never realized, were aroused by enthusiasts in drainage work, regarding the capacity of small tile. I even remember to have heard one ardent advocate claim that a two-inch tile would carry all the water from forty acres. That same man put in miles of drains on that principle. A failure by using too small tile, is likely to be followed by the other extreme of using too large tile.

TABLE.

The following table I first computed from tables given by B. Latham, in his work on sewers, in 1877. His table shows discharge in cubic feet per minute, when full. So far as I know, it is the only table which gives the acres drained by a given-sized tile on a given grade. The rainfall to be removed is considered equal to one-half inch in depth each day of twenty-four hours. The table has been used quite extensively by drainage engineers in this State, and has been found to give good results. I have revised it, corrected some errors and indicated, by omission of figures, what should be the maximum and minimum grade for each size of tile.

TABLE FOR SIZE OF TILE.

RATE OF INCLINATION.				ACRES DRAINED.						
Feet to one of rise. (Exact.)		Rise in inches per rod. (Approximate).		2-in. Tile.	3-in. Tile.	4-in. Tile.	6-in. Tile.	8-in. Tile.	10-in. Tile.	12-in. Tile.
1 foot in	10 feet,	20 inches to 1 rod	-----	6.6	18.9	—	—	—	—	—
1 "	20 "	10 "	1 "	4.7	13.0	26.8	—	—	—	—
1 "	25 "	8 "	1 "	4.2	11.4	24.0	66.2	—	—	—
1 "	30 "	6 1-3 "	1 "	3.9	10.9	21.9	61.5	126.4	—	—
1 "	40 "	5 "	1 "	3.4	9.4	19.0	53.3	109.6	190.5	—
1 "	50 "	4 "	1 "	3.0	8.4	17.0	47.7	98.0	170.4	269.0
1 "	60 "	3 1-3 "	1 "	2.7	7.6	15.6	43.4	90.0	156.0	246.0
1 "	70 "	3 "	1 "nearly	2.5	6.9	14.5	39.9	83.0	144.4	228.1
1 "	80 "	2 1-2 "	1 "	2.3	6.5	13.4	37.2	77.0	135.0	213.0
1 "	90 "	2 1-4 "	1 "	2.2	6.1	12.6	35.0	72.5	127.0	200.5
1 "	100 "	1 1-2 "	1 "	2.0	5.7	11.9	33.1	69.2	120.6	190.5
1 "	150 "	1 1-3 "	1 "	1.6	4.5	9.5	26.6	56.0	97.3	154.4
1 "	200 "	1 "	1 "	—	3.9	8.2	22.8	48.0	83.9	132.5
1 "	250 "	4-5 "	1 "	—	3.5	7.5	20.4	43.4	74.4	117.0
1 "	300 "	2-3 "	1 "	—	—	6.9	18.4	38.2	65.5	107.0
1 "	400 "	1-2 "	1 "	—	—	5.9	16.5	34.6	60.3	90.7
1 "	500 "	2-5 "	1 "	—	—	—	14.8	30.1	54.0	81.6
1 "	600 "	1-3 "	1 "	—	—	—	13.3	28.0	48.6	74.0
1 "	800 "	1-4 "	1 "	—	—	—	—	24.0	41.9	65.0
1 "	1,000 "	1-5 "	1 "	—	—	—	—	21.2	37.2	56.0
1 "	1,500 "	2-15 "	1 "	—	—	—	—	—	30.8	47.0
1 "	2,000 "	1-10 "	1 "	—	—	—	—	—	—	40.8

[NOTE.—Tile should not be laid to grades when numbers are replaced by a dash.]

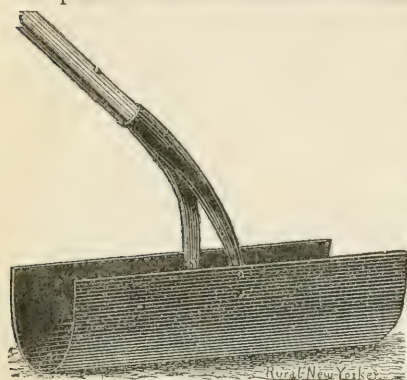
CONSTRUCTION OF A DITCH.

In almost every instance this work will have to be begun at the outlet of the drain, in order that water may not interfere with the work. If the soil will stand for a long time—that is, until the excavation for the whole ditch is finished—it is advisable to commence to lay tile at the upper end of the ditch and work towards the outlet. This method permits only clear water to enter the drain. I have, however, never seen a case in which it was practicable, but I have no doubt there are localities in which the soil will stand until the whole ditch can be excavated. Good working under-drains, even in very flat land, could be constructed without leveling under such circumstances; for, after the ditch is excavated for its whole length, irregularities in the bottom could be detected by pouring in or allowing water to run through it.

In nearly every case, however, in order to prevent caving, tile must be laid as fast as the ditch is excavated, and in such a case even the test of running water is worthless. Suppose, for instance, you are to build a drain 40 rods long, in which the maximum fall is only two feet. The profile of almost all these drains will show a rapid rise close to the outlet, and near the upper end little or no rise; frequently the drain must cut through a bank or dam. Now, in working by a water level, there are no means of ascertaining the amount of rise per rod, and a ditcher is almost certain to rise too fast at first, and, in order

to maintain his depth at the upper end, must have his bottom incline the wrong way. Even in that case it would work when the water rose above the highest point in the tile; but there would be no current above that part, and the tiles would rapidly silt up.

In excavating it is important to dig as narrow a ditch as possible. In the first place it means less earth to heave out, and in the second place a narrow



Push and Pull Scoop. Fig. 8.

ditch forms a snugger bed for the tile—an important consideration. Where a plow can be used the cutting of one or two furrows will aid the ditchers amazingly; but for some reason they frequently will not admit that it helps at all; they do not like the rough work left by the plow. For digging the common spade is the best implement for most purposes. The last spading, however, had better be done with a spade of the general form of the ordinary one, but as narrow as can be worked and admit the tile. The long narrow, tapering, tiling spades are worthless for most soils. They are good when the soil will admit of clean work, but

worthless in other soils. The wide, upper end prevents the use of this spade for cleaning.

The tile scoop, shown in figure 8, which any blacksmith can make, for cleaning the bottom, should be made of a sheet of half-round steel with the handle fastened opposite its center, so that it may be used as a push or pull scoop. The handle should rise at an angle of about 30 or 45 degrees. The scoop usually on sale is of thick, heavy wrought iron, with the handle fastened at the back end—a more awkward instrument could hardly be devised. In the first place, the earth is loosened at a disadvantage as compared with the work of the scoop with a handle fastened at the center; and, again, it is only of use as a push scoop. For two, three, or four-inch tile, one with a diameter of four inches will do nicely. For larger tile—six to eight inch—the diameter may be increased to six inches, although the smaller scoop may be made to do the work. The length should be 12 to 15 inches.

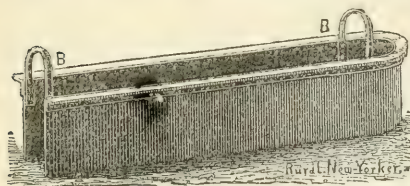
In quicksand, the excavation cannot be carried ahead of the tile, and much difficulty is experienced in keeping the tile open while constructing the drain. If the quicksand is deep—say, three or four feet—a curbing will have to be used, and it is best put in as follows: Take 12 pieces of two-by-four scantling, each about six feet long; drive these down in pairs of two on each side of the ditch, within a distance of 12 feet; put between each pair horizontal, inch boards 12 feet long. By braces between the inner uprights, prevent the earth from pushing in the sides. In excavating, first remove the sand from below the boards on each side; shove them down, throw out the center dirt last; so continue, and the quicksand cannot possibly get into the ditch. The curbing can be sunk down as deep as necessary. The boards can all be removed by taking out the bottom one first, filling with earth, and then the second one, and so on. This is best worked in three lengths at one time, taking up one length and putting one down at the same time.

When the quicksand is not over two feet in depth, it can be held back by a U shaped box of iron without bottom or top, as seen in Fig. 9. Wood is

rather thick to sink in the sand, but it could, doubtless, be successfully used. Fig. 9 is a view of a box, built after a design of my own of 1-16 boiler plate iron; its length is five feet; depth, 15 inches; width, one foot. Two handles, B B, are put on for the purpose of moving; an edge of angle-iron is riveted on the top. This was made for laying eight-inch tile. For smaller tile, the pieces might be much nearer together. The back handle, B, is made of three-quarter inch round iron to prevent the collapse of the back end, owing to pressure from the sand. The arrangement has worked well.

KIND OF UNDER-DRAINS.

Under-drains are best constructed of tile, and the shape best suited for every place is the plain cylindrical form. The tile are now usually laid with the ends abutting against each other, leaving as smooth a channel as possible for the water. In soil that is not easily washed, no protection at the joints is needed; in sandy or peaty soils the tops should be covered, so that the water will be forced to enter at the bottom of the joint; it will then be likely to be free from sediment. The best covering for joints of tile is, in my opinion, a piece of



Curbing Box. Fig. 9.

closely mown turf, laid grass down. This is especially good, as it seems also to prevent lateral displacement of the tile. Small pieces of tarred paper, of old tiles, of tin, etc., answer a good purpose. Tarred paper is always cheap and convenient to use. Turf is sometimes objected to because of the silt that may be worked into the tile. The water gets into the tile principally at the joints, though the tile is in itself porous. This was strongly illustrated by a construction that was carried out by the Lansing Wheelbarrow Works, owing to a misunderstanding of some of my directions. In laying the tile the joints were completely enveloped with tarred paper. The result was that no water entered the tile, and the paper had to be removed before the tile would work.

TILE LAYING TO GRADE.

As already noticed in a previous place, this requires much care. It is usually necessary to test the bottom of the ditch in advance of laying the tile. And also every tile after it is laid. As this work will be a permanent job, if done well, no pains should be spared in laying the tile, which is the least laborious part of the work.

My method is—and this method has only to be tried to be adopted by all—to stretch a strong cord about three feet above the ground, and get this parallel to the required grade, as shown in Fig. 10. Now by supporting this string at intervals of 30 feet (see Fig. 10), the variation from a straight line will be insignificant, and by measuring down the required distance one can determine the correct bottom of the ditch with exceeding accuracy and with great celerity. This method of preserving a true line for the tile I wish to call particular attention to; for it may be used not only to preserve the grade line, but to secure it, and hence be a substitute for a line of levels. Fig. 10 shows, I think, quite clearly how the string is carried, the stakes or posts are driven on opposite sides of the ditch, and then connected with a cross-bar. This cross-bar should be arranged so that either end can be raised so as to be made truly level. For this purpose three forms of clamps are shown in detail at A,

B, and C. These, I think, will be understood without explanation. The clamp B is formed by merely sawing a slot in the cross-bar, in which slip the upright stake; two bolts are put through, one to prevent splitting; the other to tighten by means of a wrench or a thumb-screw. The common quilting frame clamps would answer very nicely. If a survey has been previously made, and the depth at each point is given, the cross-bars are set by measuring up from the surface so as to be a uniform distance from the bottom. They should be seven or eight feet above bottom of ditch, where they will not interfere with tile laying. Over the center of the ditch on the cross-bars pull the line: with a stick whose length is equal the height of the line above the bottom, say seven or eight feet as the case may be, the bottom can be readily tested.

If no survey has been previously made, we can use these to determine the fall and the grade line. For instance, at 1 in Fig. 10, we set our first cross-bar and stakes, say so as to give a depth of four feet.

At the farthest distance that can be seen we set another cross-bar and stakes,

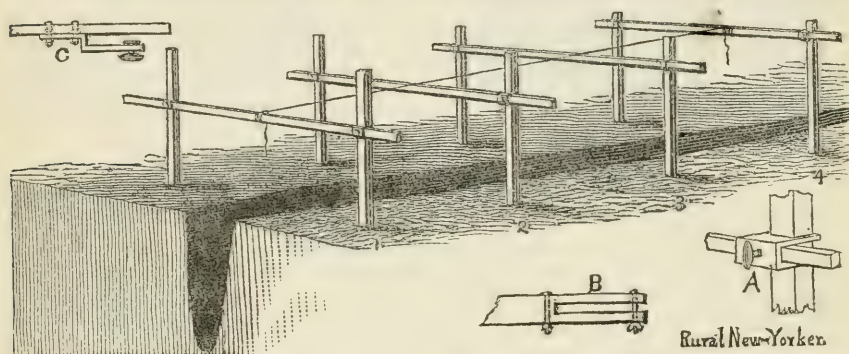


Fig. 10.

so as to give us the required depth at that point, say three feet. To find the fall between these two, we have only to sight over a level of any construction, from over first cross-bar to our last, and measure the distance of the intersection of this sight line to our cross-bar; this last method is a rough one, and will only serve to show whether we have any fall or not. After we find there is sufficient fall between the two cross-bars, any number of intermediate ones can be set by sighting, and accurately too. Leave these in until the tiles are laid under any given one, and you will find your work done with all the accuracy needed, and in very much less time than if you had attempted any method which depended on leveling the bottom itself. This method will substitute certainty for uncertainty, and give you success, where by laying tile by the eye or running water you would be likely to fail.



Fig. 11.

LAYING THE TILE.

It is not a good plan, unless the bottom is unusually hard, to walk in the ditch after it has been prepared for the tile. If tiles are laid by hand, the better way is to keep about one foot of earth filled over the tiles, and, standing on that, reach over and lay the tiles. This gives an excellent position for using the push-and-pull tile scoop, and in sandy or mucky soils when the tiles laid need frequent cleaning by hand, it is certainly the best method. The bottom is tested in advance by measuring from the overhead string, and each tile is tested after being laid. In peaty or mucky soils great care is necessary that the ditch be not excavated too deep. No random filling will give as uniform a bottom as the original undisturbed muck. It might be a good plan to excavate several inches below the grade line and fill to the grade with gravel; but this is hardly necessary. In quick-sand, the side pressure is more likely to cause the tiles to rise, and the ditch should be filled at once to hold the tiles down. No board should be used for bottom in either case. Tile will settle uniformly if the soil is of the same character throughout. In quick-sand no alarm need be felt if the tile fills one-half or three-fourths full of sand when the work is progressing. If there is any current whatever, sand may be washed out clean by a flush of water. It is a good thing in such soils to keep a long iron rod in the tile, to be worked ahead occasionally to prevent the sand from settling in the tile. The joints of tile in quick-sand and muck should be made as close as possible; for this purpose a wrapping of tarred paper is excellent. Collars might in such soils serve a good purpose. Where the soils will stand well, the tiles can be laid from the surface with good results. A pole with an iron pin long enough to hold one tile is commonly used.

Fig. 11 is a view of the instrument usually used for this purpose. A much better arrangement for small tile is shown in use in Fig 12. The rod on which the

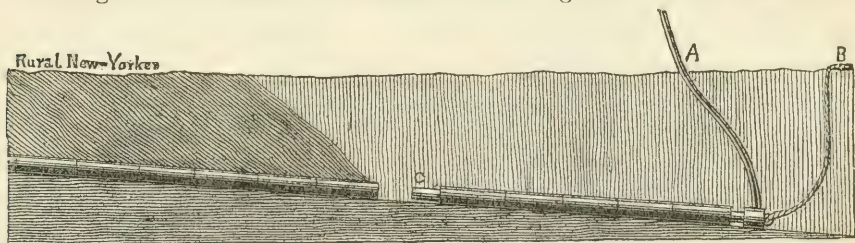


Fig. 12.

pipes are strung is sufficiently long to hold six tiles, and be inserted six or eight inches in those previously laid. They can be laid and the joints wrapped, if necessary, while on the pin. After the tiles are laid they are at once covered sufficiently to hold them firmly in place, and the pin is pulled out with the rope attached to it. An old scythe handle is the best form for the handle to the long pin. The diameter of the pin should be such as to slip into the tile easily, but not much smaller. In filling, care must be taken when the dirt is first thrown in, not to move the tiles laterally. After they are covered to a depth of about a foot, if the ground is sufficiently solid, the filling can be

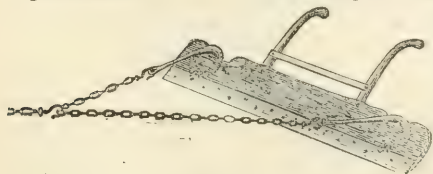


Fig. 13.

done with a team and scraper very cheaply. Use a long chain and keep the scraper on one side and the team on the other. Fig. 13 shows a good form of a filling scraper. After trying about every way, I feel safe in saying that this is the only satisfactory way.

WILL IT PAY TO DRAIN ?

This is a question put very frequently, but yet one that is difficult to answer in a general way. There are circumstances to be taken into account that may make special cases very different from ordinary ones. I could fill the whole time with examples showing that worthless land of little or no value had been converted by drainage into land whose selling value was \$50 or more per acre. I could give repeated examples showing that the productiveness of land had been increased 100 or 200 per cent—by such a comparatively trifling expenditure—but I will trouble you with only one or two cases. You need only look around you to see them.

It will never pay to underdrain, unless you are prepared to do it properly. Every case of failure to reap benefit by drainage can be traced to some fatal error in the plan or construction of the drain—The proper construction of a line of tile drain in order to obtain its maximum efficiency, requires as much or more accuracy than the finest cabinet work. Every deviation sideways from a straight line detracts from its carrying capacity; every deviation up or down from its grade line is more or less fatal to its efficiency. The country is full of ditchers who, according to their own story, have laid miles of tile in England or Ireland, who pretend to have the skill to determine the proper inclination of the grade line entirely by the eye. I have tested the work of some of the best men of this class (one, especially, Mr. Wheeler, who was the best ditcher I ever saw) by running a level over the bottom of the ditch after they supposed it was fitted to receive the tile, and I have found variations from the grade line within forty rods equal to one foot in depth, and sufficient to nearly destroy the value of the drain.

My own opinion is that ninety per cent of the class of work done by these men is more or less of a failure, and that there are miles of drains in operation not running to one-half or one-quarter their full capacity. This of course means that for the benefits received, too great an expenditure has been made for tile. Now it will never pay to lay tile unless they are laid in such a way that their full capacity is utilized. It does not pay to give twenty-six dollars per thousand, forty-four cents per rod, for four-inch tile, and have them laid so that they will only do the work of two-inch tile, worth ten dollars per thousand (sixteen and a half cents per rod); yet this is done more frequently than many men suppose. It is often done for men who feel fully satisfied that they have had a good job done, simply because they do not know what a good job is.

In all ordinary cases it will pay to drain, and in any case it will pay to take such precautions as will insure you that your tile will work to full capacity.

LAW OF THE FARM.

At the Grand Rapids Institute Judge Parrish of the superior court of that city gave a lecture on the "Law of the Farm." This lecture was one of a series given before the Grand Rapids Farmers' Club. Through the kindness of Judge Parrish and Mr. F. M. Carroll, editor of the *Agricultural World*, I have been enabled to publish in this Report the series of lectures up to and including the sixteenth. I desire to especially acknowledge my obligations to Mr. Carroll for the use of office files of the *Agricultural World* and other favors connected with the publication of these lectures. The farmers of our State will find them to contain much valuable information.

LECTURE NUMBER ONE.

In speaking of the farmer's relation to law I would observe that the law knows no distinction of persons. The variety of litigation among farmers is just as great as that of any other class; and, considering the business transactions in which they are engaged as a class, there is just as much litigation among farmers or with farmers as any other class of the commonwealth. Moreover farmers are as litigious, and as liable to become involved as any other class of people, and just as belligerent and persistent in maintaining their own notions of what they think the law is or ought to be.

In the course of my professional life I have known many instances of neighboring farmers spending every dollar they had in litigation. In many instances which have come under my observation valuable farms have gone into the vortex of litigation, sometimes merely to gratify personal spite. The farmer possesses just as much of temper and spirit which promotes litigation, and supports and maintains the legal profession, as any other people in the country.

I notice that about one-fourth of the time of the circuit court is occupied in disposing of appeal cases from justices' courts, cases involving five dollars and upwards; sums for which, in many cases, no human being could afford to litigate. The man who persists in that class of litigation generally does it because he is mad, and the madder he gets the more he is willing to fee his lawyer. I am convinced that a farmer will get just as mad as any other man, and as often let his temper run away with his judgment. His wife will sometimes get as mad as he is.

My first reading lessons at school were the parables in Webster's old spelling book. I shall never forget the "Milkmaid," and the "Fox and the

Brambles." But the one that impressed most was that of the "Impartial Judge." A farmer came to a neighboring lawyer, expressing great concern for an accident which he said had just happened. "One of your oxen," continued he, "has been gored by an unlucky bull of mine; and I should be glad to know how I can make you reparation." "Thou art a very honest fellow," replied the lawyer, "and will not think it unreasonable that I expect one of thy oxen in return." "It is no more than justice," said the farmer, "but what did I say? I mistake; it is your bull that killed one of my oxen." "Indeed," says the lawyer, "that alters the case. I must inquire into the affair, and if—and if—" Said the farmer; "The business would have been concluded without an *if*, had you been as ready to do justice to others as to exact it from them."

This parable has left the impression on many a youthful mind that the lawyer was a crafty, dishonest wretch, seeking to avoid a just responsibility, while the farmer was the personification of honesty. The readiness of the lawyer to demand compensation for the loss of his ox, and ingenuity of the farmer in stating the case, are characteristics which are frequently noticed.

While I was yet a boy, and this parable fresh in my mind, a circumstance, similar to that spoken of in the parable, occurred in the neighborhood where I lived, and in my presence. It was in Oakland county, Michigan, about 1837. The county was new and sparsely settled. The roads were bad and sometimes impassible. Every spring an overseer of highways was chosen; we called him the "pathmaster." At his call, the settlers within his district assembled with yokes of oxen, shovels, spades, axes, and sometimes a dilapidated scraper, to "work on the road."

At the time of which I am speaking the pathmaster was a tall, swarthy, imperious looking pioneer, ignorant as a horseblock, could neither read nor write. The neighbors called him the "Emperor." He kept his tally by making pin holes in the tally sheet. One pin hole represented a day's work; two pin holes, one over the other, a half day, and so on. He furnished a yoke of oxen.

Fences were few, only sufficient to protect the crops. What few domestic animals the people had, by common consent, ran at large in the woods and subsisted on what they could find. One of the neighbors owned a bull—a very gentle, peaceable animal, which ranged in the woods with the other cattle. No one supposed the bull to be vicious or dangerous. Indeed he was quite a pet in the neighborhood. While we were at work the neighbors' cattle, together with the bull, gathered around, some brousing from the trees felled by the workmen, others seeking the shade. Suddenly the bull made a plunge at one of the "Emperor's" oxen and fatally gored him.

He supposed that the owner of the unlucky bull would have to pay for the ox, and, indeed, the owner thought so himself. The matter would undoubtedly have been settled without an *if* had it not been for certain influences, which are sometimes brought to bear in such cases.

Among those who were working on the road at this time was a man from "York State" who had graduated as a lawyer, but who, for want of proper encouragement in that profession, had turned pioneer and settled in the woods of Michigan. His name was S. A. L. Ward. The neighbors bunched the initials of his name, and called him old "Sal." He was also sometimes called a pettifogger. "Sal" advised the owner of the bull that he was not liable, and could not be legally made to pay for the ox. It happened also that there was a blacksmith in the neighborhood by the name of Troutwine,

who made considerable pretensions to a knowledge of the law, and was withal a smooth and valuable talker, and very slippery. The neighbors paraphrased his name and called him Trouteel. Trouteel espoused the side of the gored ox. The parties wanted to settle the case, which only involved the value of the ox; but these pettifoggers knew their business. The result was a lawsuit. Whoever is acquainted with early pioneer life will not need to be told that the day of a lawsuit is an event of considerable importance in a new country. "Truteel" was too much for "Sal" before the justice, and the owner of the ox obtained judgment for thirty dollars. The case was taken to the higher court and after about a year and a half of litigation the case was reversed and judgment rendered against the "Emperor" who owned the gored ox for all the costs amounting to about one hundred and eighty dollars. In order to pay this and his other expenses and lawyer's fees he was obliged to mortgage his farm. Besides the expense several neighbors were more or less edgewise towards each other for several years.

The principles of the common law upon which this case was decided in favor of the unlucky bull, govern all cases of this character when no statute intervenes; these are as old as the common law, so old that the memory of man runneth not to the contrary. They date back to the days of Abraham, Isaac, and Jacob, whose flocks and herds grazed at large on the fertile plains of Assyria.

In another case, when a bull running at large in the public highway suddenly plunged at a valuable horse and gored it to death, the owner was held to be liable.

So in two bitter law suits on account of killing sheep, which occurred in our vicinity in an early day, when there was no question about the dogs killing sheep because they were seen in the act. In one case the owner of the dog was held liable, and in the other not. All these cases depended on an if; and it is quite important to know when the if comes in. The law in each case was the same. There were facts and circumstances which differed.

The common law declares that *the owner or keeper of animals is liable for any injury which, by his negligence, they are allowed to inflict, except where the fault of the party injured contributes to the injury sustained.*

The question is, therefore, in all such cases one of negligence. What constitutes negligence on the part of a farmer in the care of animals is what he wants to know. The farmer's flocks and herds sometimes become vicious and do injury to persons and animals. They sometimes injure or destroy the crops. They are sometimes killed or injured by railroads. This question of negligence respecting animals also involves the matter of fences.

Indeed, a large part of litigation in which the farmer becomes involved grows out of the care of what he calls his stock, among which we may reckon his dog. It might, therefore, be made an interesting and profitable inquiry to the farmer.

LECTURE NUMBER TWO.

Domestic animals, such as cattle, sheep, hogs, horses, and even dogs are presumed to be of an amiable disposition, and not naturally inclined to be vicious. Hence it is not considered negligent in the owner to allow them to run at large, when no law forbids. A farmer has no reason to apprehend

that his bull will gore his neighbor's ox, or that his dog will kill his neighbor's sheep, because they are not naturally inclined to do such mischief. And where there is no negligence there is no liability in this respect. But these animals sometimes become vicious; and as soon as the owner knows or has good reason to believe that his animal is likely to do mischief, he must take care of him, and after his knowledge of his vicious disposition he is liable for any injury of the nature which he has shown a disposition to commit.

In the case which I mentioned in my last address to the club, when the bull killed the ox, it was held that the owner of the bull was not liable, for the reason that the bull had never before manifested a vicious disposition, and the owner had never had reason to suppose that he would do that sort of mischief. The owner was not therefore negligent in the matter. If your bull is in the habit of goring oxen, or your dog in the habit of killing sheep, it becomes your duty to take care of him, and you are liable for any injury which is likely to be the result of this vicious propensity, if this propensity is known to you. In order to make you liable, however, you must have knowledge, or reasonable cause to believe, that the animal has committed an act of the kind complained of; that is to say, if your bull gores an ox, in order to make you liable for the injury, you must have knowledge that your bull has done similar mischief; at least, you must have good reason, from the previous vicious habit of the animal, to know that he was likely to do that sort of mischief.

To illustrate: In North Carolina a farmer's bull running at large, killed a valuable horse. In a suit brought by the owner of the horse for the injury, the only evidence of the vicious habit of the bull was that he had previously chased a man, and compelled him to seek safety by climbing the fence. The owner of the bull was informed of this circumstance; and it was urged that this knowledge of the vicious propensity of the animal was sufficient to fix his liability. On the other hand, it was insisted that he was not liable, because it had not been shown that the bull had ever assailed horses. The court declared the rule to be this: That as soon as the owner knows, or has good reason to believe that the animal is likely to do mischief, he must take care of him; it makes no difference whether this ground of suspicion arises from one act or repeated acts; the only restriction is, that the act done must be such as to furnish a reasonable inference that the animal is likely to commit an act of the kind complained of. If a bull so far loses sight of his submission to the "dominion of man" as on one occasion to rebel and offer combat, it does not follow, as a matter of course, that he would be likely to attack a horse or an ox, although it would depend upon the nature of the animal, the provocation, and other circumstances attending the act, which would be proper matters for a jury to consider in a given case.

If a dog is known to have killed one sheep, a jury would be able to infer, from the knowledge of that animal, that he would kill another if an opportunity presented itself. If so, the owner would be liable. But if a dog is known to have bitten a man, we would not be apt to infer that he would kill sheep, because the one act proceeds from voraciousness, the other from combativeness; and fierce dogs are not apt to be sheep-killing dogs. So it has been held, that an action cannot be sustained against the owner of a hog for injury done to a person by proof that the hog would eat chickens and ducks. One act may sometimes furnish as convincing proof of the animal as a dozen, and the inference may sometimes be made from a single act brought home to the knowledge of the owner.

When a sow and pigs bit, mutilated, and mangled a certain cow and calf,

while the cow was in the act of calving, so that the cow and calf both died, it was held that the owner of the cow and calf could not recover, because there was no evidence that the owner of the sow and pigs knew or had reason to believe that they were accustomed to such or similar mischief.

I now recur to the first lawsuit in which I was ever employed as attorney. A farmer's dog had killed three of his neighbor's sheep, and an action was brought to recover the value of the sheep. I was employed after the suit was commenced by the owner of the sheep to prosecute the suit against the owner of the dog. I proved beyond all question that the dog had killed the sheep, and that the sheep were worth thirty-eight dollars, but I could not prove that the dog had ever before been known to kill sheep. I was not able to prove even that the dog had ever shown any vicious propensity whatever. Indeed, it appeared in evidence that the dog was an amiable dog, valuable to his master on the farm, and that this was his first offense. The owner of the dog was not, therefore, liable, and the neighbor lost three valuable sheep, and was, moreover, compelled to pay the costs of the suit. This case was decided in accordance with common law, which I have been considering. The rule of the common law is very ancient, and has been applied in like cases in this country ever since farmers have kept dogs and sheep; but in some states it has been abrogated by statutory enactments. Indeed, much that I may say respecting the rules of the common law will not apply when the statute of the State intervenes.

In 1850 the legislature of Michigan enacted a law which provided that if any dog shall have killed, or assisted in killing, wounding, or worrying any sheep, lamb, swine, cattle, or other domestic animal, or that shall assault or bite or injure any person while traveling the highway or out of the enclosure of the owner or keeper of such dog, such owner or keeper shall be liable to the owner of such property or person injured in double the amount of damages sustained, to be recovered in an action of trespass on the case; and it shall not be necessary, in order to sustain an action, to prove that the owner or keeper knew that such dog was accustomed to do such damage or mischief. Thus by a single dash of the pen the Legislature set aside the old law so far as dogs are concerned, so that the farmer is responsible in Michigan for damage done by his dog whether he had previous knowledge of his vicious propensity or not.

It will be observed that I have been speaking of injuries done by domestic animals while running at large, where no law prohibits, to other animals or persons, and not to that damage which they sometimes do crops by reason of their well known propensity to rove in search of food, and by reason of trespasses on the lands of others than their owners.

LECTURE NUMBER THREE.

In the early history of the common law, it was laid down as a general rule that if a person brought on his premises and collected and used for his own purpose anything which was likely to do mischief if it escaped, he kept it at his peril, and he was *prima facie* liable for all damages which were the natural consequences of its escape.

The person whose grass or corn was eaten down by the escaping cattle of his

neighbor, or whose cellar was invaded by the filth of his neighbor's privy, or whose habitation was made unhealthy by the fumes and noisome vapors of his neighbor's alkali works, was said to be damaged without any fault of his own, and it was no more than reasonable and just that the neighbor, who had brought something on his own premises which was not naturally there, harmless to others so long as it was confined to his own property, but which he knew to be mischievous if it got on his neighbor's premises, should be obliged to make good the damages which ensued if he does not succeed in confining it to his own premises or under his own control; and it made no difference whether the things so brought were beasts, or water, or filth, or stench, or any other thing which he knew to be mischievous.

The owner of cattle was bound, at his peril, to restrain them from trespassing upon the lands of his neighbor; and, if he neglected to do so, he was not only precluded from recovering damages for any injury which the cattle might sustain by going upon the lands of others, but he was himself liable to make compensation for the trespass committed by his cattle.

In a recent case in Maryland, where an ox escaped from his owner and got on the track of a railroad, by means of which a train was wrecked and great damage ensued, the Court of Appeals of that State held that the owner of the ox was liable for all the damages. This old rule of the common law is subject to some limitations. Your fire, by which you cook your daily meal, is known to you to be liable to consume not only your own but your neighbor's house, if it escapes your control. Your reservoir of water may break away by some overwhelming flood, and deluge your neighbor's field. Your horses may become frightened and break into your neighbor's enclosure or injure your neighbor's property. The old rule has therefore been somewhat modified, so that, when the injury is unavoidable and your conduct in the matter free from blame, you will not be liable.

Injuries arising from extraordinary or accidental circumstances, for which no one is at fault, must be borne by those on whom the injury falls. Accordingly it was held by the Supreme Court of New Hampshire that when a person whose horse, frightened by a locomotive, became uncontrollable, ran away with him, went upon the land of another and did serious injury to the other's property, he is not liable for the damage if it was not caused by any fault on his part; the court saying that, if in the prosecution of a lawful act, a casualty purely accidental arises, no action can be supported for any injury arising therefrom. So where one, making a friendly call upon his neighbor who kept several swarms of bees, hitched his horse at the front gate, and while in the house engaged in conversation with the neighbor, the bees attacked the horse in vast numbers and stung it so that it died, it was held that the owner of the bees was not liable.

It is an important element in the matter that you have knowledge of the dangerous character or mischievous propensity of the thing or animal introduced or kept by you. The natural consequences of the escape must be known; the natural consequences of the escape of your cattle and other tame beasts, as the eating and trampling down of grass, corn, oats and other crops. The damage arising from the escape of filth and stench are matters of universal knowledge of which everybody is presumed to be cognizant, and of which everybody is bound to take notice. Since you are bound to know those things, the law presumes that you know them, and holds you responsible if any damage arises from any fault or negligence of yours. But all tame animals are not vicious. The goading of a man is not the ordinary consequence of the

escape of a tame ox; the killing of sheep is not the ordinary propensity of a dog; but when an ox becomes vicious and liable to gore people, or a dog takes a notion to kill sheep, it is an exception to the general rule, and all mankind are not presumed to know of this vicious propensity. Hence in order to render the owner liable for such mischief done, it is necessary to bring home to him knowledge of the vicious tendency, before the law makes him liable.

When the knowledge is brought home to him of this bad character, he is then presumed to know the ordinary consequences of the escape of such animal, and is responsible for the injury done. If you have knowledge that the boiler which you attach to your threshing machine is defective, and liable to explode and do injury, you use it at your peril.

A thousand questions will suggest themselves to the mind, in connection with this subject. The difficulty arises, not in understanding the law so much as in knowing how to apply it to a given state of facts. The great kaleidoscope of judicial proceedings never presents two cases whose facts are precisely alike. It is one thing to know the law, and quite another thing to know how to apply it to the case in hand.

LECTURE NUMBER FOUR.

FARMERS' RELATION TO LAW.

What I have been saying respecting injuries done by cattle and other things kept and used by farmers, for which the owner or keeper is responsible, comes under the head of what the law denominates negligence. In general, any person who has caused an injury or loss to another by his negligence, whether he be a farmer, doctor, or lawyer, is responsible for the loss or injury. If your lawyer manages your business so negligently that you sustain loss or injury thereby, he is liable to you for the damages. So if a doctor, by his negligence in setting a broken limb, or in treating your disease, injures you, he must in like manner respond.

There is no class of people more negligent, in the ordinary sense of the term, than farmers. Indeed, I have sometimes thought that, as the country improves and they grow forehanded, they become lazy and inattentive to some of the ordinary responsibilities of life. This is manifested in dilapidated fences, whereby his stock is liable to escape and run at large. His farming implements are frequently exposed to the wear and tear of the elements. The progress of invention enables him to lead a comparatively easy life. Very few farmers work as hard or as many hours as an ordinary mechanic. The farming community is too prosperous, under the present state of affairs, to devote much time to small matters which once occupied the attention of the pioneer. His front gate or fence and his "door-yard" frequently show a reckless neglect. He seems, in many cases, to have no idea of how much a beautiful lawn in front of his house would add to the beauty and value of his homestead. It would even make his children grow up and appear more graceful and genteel. The chances are that he will have his barn, cow yard, or hog pen in front of his house. In this improved country there is no class of people who are so independent and who have so much leisure as the farmer. The only individual about the farm whose work is never done, and who never sees a leisure

moment until she becomes an invalid, is the farmer's wife. If the farmer should allow his oxen or his horses to work as unceasingly as his wife does, he would be liable to fine and imprisonment under the statutes of the State. All farmers are not alike. There are many noble exceptions to what I have been saying. God made the country and adorned its hills and valleys with a beauty and grandeur which ought not to be too much sacrificed by the negligence of man.

Negligence is that want of reasonable care which should be exercised by a person of ordinary prudence under all the circumstances. A farmer comes to the city with his team, wagon, and family to do a little trading. He hitches his horses in a loose, careless, and negligent manner, or perhaps, as is sometimes the case, neglects to hitch them at all. His team becomes frightened at some little disturbance and goes dashing through the crowded streets, smashing buggies and carriages, and often injuring or killing women and children. He cannot shield himself from liability by calling it an accident. Unhitched horses are taken up by the police almost every day in cities. A farmer owned a horse which was accustomed to bite persons who came within his reach. He was so vicious in this respect that he was provided with a muzzle when in places where there was opportunity for him to bite persons. The farmer drove him to town, hitched him near the sidewalk where people were passing, and neglected the muzzle. The consequence was that a passer-by was badly bitten. The farmer was compelled to pay the damages and costs, which were more than the horse was worth. Absent-mindedness is no excuse for negligence.

A few years ago a Mr. Joslin drove his team and carriage to the county poor-house in Clinton county, in this State, and hitched his team to a post by the side of the traveled highway, and in such a manner that the carriage stood out diagonally in the street between sixteen and seventeen feet. Mr. Le Baron, in driving along the road with a team and lumber wagon, the hub of one wheel of his wagon caught the wheel of Joslin's carriage, overturned, broke, and otherwise damaged his carriage. It seemed that Joslin had so hitched his horses that a slight backing of one foot would necessarily bring the wheel into the traveled track, and that, as Le Baron was passing, the horse did so back, which caused the collision. Joslin sued Le Baron for the injury to the carriage; and the case was taken to the supreme court twice. It was finally decided, and the court held, that the manner in which Mr. Joslin had left his team was such negligence, in itself, as would preclude him from complaint for such a mishap. Nothing else, says the court, could be expected, without very considerable care and forethought on the part of a passer-by. You can better imagine than I can state the costs of this litigation to Mr. Joslin, besides the damage to his carriage for this careless manner of hitching his team, and which a moment's thought and attention might have avoided.

In connection with this subject may be mentioned the use of fire in clearing land. To set fire to brush, stubble, wood, timber, grass, or other material which may incumber one's land, is a lawful act, for which no liability can be incurred, unless the fire were kindled at an improper time, were carelessly managed, or something of negligence can be shown. A proprietor setting fire on his own land, is not an insurer that no injury shall happen to his neighbor, and negligence or misconduct is the gist of the liability, and the burden of proof of negligence is on the person who claims to have been injured. The destruction of property by fire does not raise a presumption of negligence. Every person has a right to kindle a fire on his own land for the purposes of husbandry, if he does it at a proper time, and in a suitable manner, and uses

reasonable care and diligence to prevent it spreading and doing injury to the property of others. The time may be suitable and the manner prudent; and yet if he be guilty of negligence in taking care of it, and it spreads and injures the property of another in consequence of such negligence, he is liable in damages for the injury done; and it is immaterial whether the proof establishes gross negligence, or only a want of ordinary care on the part of the person who sets the fire.

I will endeavor to illustrate this question, in the use of fire, by a few cases in which the party's conduct has been considered. Jones entered a house with a lighted candle; the house was soon after destroyed by fire. King set out a fire for the purpose of clearing his land, the weather being warm and the land dry. Adams started a fire on his farm, and left it apparently safe; an unlooked-for change in the weather ensued; a strong wind sprang up and carried the fire to the adjoining premises. Smith set fire to a heap of logs under circumstances similar to those last named, and the same consequences followed. In all these cases, these facts standing alone were held not sufficient to raise the presumption of negligence and fix the liability of the party setting the fire. On the other hand, Jones, while driving a herd of sheep through the country, encamped near a farmer's premises, and started a fire near his house and barn; there was a quantity of dry brush and other material scattered around. Jones continued his journey without extinguishing the fire, and the farmer's barn was burned. Pope, having given a party permission to cut wood on his land, started a fire very near one of the piles, which escaped from his control and consumed it. Jones, intending to burn up the brush on his own land, set fire to it within six feet of his neighbor's land, which was also covered with brush. Smith, in a very dry time, set fire to a heap of logs within five yards of his neighbor's fence; a dead pine tree and much combustible matter being between the log-pile and the fence. In all these cases, negligence was held to be manifest; and the parties setting the fire were obliged to respond in damages. So when Mr. Sun, in an unusually dry summer, set fire to logs on his fallow, adjoining the woodland of his neighbor, the fallow and the woodland were both covered with combustible matter; the day before the fire was set there had been a heavy shower; but it afterwards became dry and hot, and a high wind carried the fire to the neighbor's woodland. So H., having stacked his hay in too green a condition, was warned by his neighbor that it would be liable to generate fire; subsequently, observing it smoking, he remarked that he would "chance it;" ultimately it burst into a flame, which spread to his neighbor's barn and consumed it. So when Stevens was engaged in threshing wheat in a field, with a steam engine, the wind increased so as to make it dangerous to continue to run the machine; but he kept on, and his neighbor's property was destroyed. In these cases, L., H., and S. were held chargeable with negligence, and were obliged to pay the damages.

LECTURE NUMBER FIVE.

At common law no man is obliged to fence his lands. The owner of beasts is bound to restrain them, and he is answerable for any trespass which they may commit. In other words, by the common law, the owner of cattle must fence them in, and the neighbor is not bound to fence them out.

Fences are to some extent a modern invention. In old times, herdsmen were employed to keep the herd in its proper place. These shepherds used slings or a shepherd's staff instead of fences. Herdsmen are employed in many old countries at this day. In Spain the herdsmen use the same kind of sling in controlling herds that David used in his conflict with Goliath. Many of these herdsmen, like David, are very expert with a sling. They have a little bag attached to their belt, in which they carry the smooth stones from the brook. It is wonderful how they will control a herd of half wild cattle with these slings.

The owner of land on which there is a public highway owns the soil on which the highway passes, subject to the right of the public to use it for the purposes of a highway. He is entitled to the timber and grass on its surface, and the minerals below it are his, and he may maintain trespass for any injury done to them. There is no common right of pasture in a highway. You are under just as much obligation to restrain your cattle from destroying the grass, trees, or herbage, in the highway along my premises as you are to keep them out of my cornfield, except so far as the public use will permit or deem necessary.

As I have before remarked, every man is bound not to trespass upon the land of another; so is he bound to keep his cattle from trespassing also: for, if by his negligence they stray upon the land of another and do injury, he is liable for the damage. He is not only liable for the damage, but he is precluded from recovering for any injury which the cattle may sustain while thus trespassing. And I will say here, that it makes no difference whether that neighbor on whom you or your cattle trespass be a farmer or a railroad company. We are apt to think that railroad companies have no rights that people are bound to respect. They are represented to us as being great monopolies, established in some mysterious way by the patronage of the government; that they are a part of that political hobgoblin called the money power; that, instead of being a grand combination of capital for the purpose of developing the resources of the country and advancing the progress of civilization and the public interests, giving employment to thousands and enhancing the value of farms and farmers' products, they are grasping, tyrannical, unprincipled, soulless corporations, entitled to no consideration or respect. Indeed, farmers, like some other people, are apt to think that there is a natural hostility existing between capital in railroads and themselves.

As a general rule, a railroad company owns the land, or at least the right of way over the land, on which the road is located. It frequently happens that they have bought it and paid for it the same as you have bought and paid for your farm; and we have no more right to trespass upon their property than upon that of any other individual, and we are generally subject to the same law for damages as we would be in case of a trespass upon our neighbor's property. You are under just as much obligation to restrain your cattle from trespassing upon the property of a railroad company as you are to keep them off your neighbor's farm; and if they are there committing a trespass, through your negligence, you cannot recover damages for any injury done to them, unless the company is at fault. A railroad company is not obliged to fence its track unless required to do so by statute.

It is very provoking sometimes to find a neighbor's cattle or hogs in your cornfield, and if you have a dog you are very apt to set him on. In one instance which came under my observation, a farmer found several hogs in his cornfield and set his dog to drive them out. The dog so bit and worried them that five of them died. The owner of the dog was made to pay for them.

But when a cow under such circumstances was injured by being driven off by a dog set on by the owner of the land in which she was trespassing, it was held by the Supreme Court of this State that he was not liable for the injury unless there was something in the size, character, or habits of the dog, or in the mode of setting him on or pursuing, which would negative the idea of ordinary care or prudence, which is equivalent to saying one must use ordinary care and prudence in driving cattle off his premises, even when they are wrongfully there destroying crops. Partition fences are quite generally, in this country, matters of agreement between the respective occupants of land; each takes his proportion to build and keep in repair.

Where there is no mutual arrangement they are generally regulated by statute, and most of the questions which have arisen here upon this subject have arisen under the various statutes which have been enacted in respect to it. Each state has a statute of its own, and they are frequently changed. These statutes are remedial, and intended to provide against existing defects in the common law. They must therefore, receive a liberal or comprehensive construction, both as to the extent of the change and the means of carrying them into effect. The statutes of Michigan provides that when any controversy shall arise about the right of the respective occupants in partition fences, or their obligation to maintain the same, either party may apply to the fence viewers, who are authorized to apportion to each his share thereof, and to direct the time within which each party shall erect or repair his share of the fence. If any party shall neglect or refuse to erect and maintain the part of any fence assigned to him by the fence viewers, the same may be erected and maintained by the aggrieved party, who shall be entitled to recover double the value thereof.

The statute further provides that the respective occupants of land enclosed with fences, shall keep up and maintain partition fences between their own and the next adjoining inclosure so long as both parties continue to improve the same. I presume all are aware that a legal fence is one four feet and a half high. Adjoining proprietors are always at liberty, if they see fit, to dispense with partition fences all together, and if such fences are erected, no particular part thereof belongs to either, to be kept in repair by him until in some legal mode the partition is made; that is, either by agreement or by the action of the fence viewers. Until one or the other has taken the necessary steps to effectuate such a division, it is to be presumed he is satisfied to trust his property to such securities as the rules of the common law, which I have mentioned, can do for him, and to respond in damages under those rules if his cattle commit injury on the lands of his neighbor.

I received a letter yesterday from a farmer requesting me to define what property belongs to real estate. He says: "Suppose I sell my farm, and there are on it fence posts corded up, stones piled up, patent fence not used, lumber, and cordwood, have I the right to take it as personal property?" This question comes under the head of what we call the law of fixtures. This is a branch of the law covering considerable legal territory. Mr. Ewell, of Chicago, quite an eminent law writer, has given us a work on this subject of nearly 600 pages. To define just what property belongs to real estate, and passes with it on sale, would be attended with some difficulty. Controversies involving this question very frequently arise, and are often brought into litigation.

Mr. Ewell says there is perhaps no legal term which has been used in so many differing and often contradictory significations as the term "fixtures." The contrariety seems to have arisen from the different standpoints from

which the subject has been viewed with reference to the relation existing among the parties between whom the question has arisen—the degree of annexation to the realty—the purpose for and the intention with which such annexation was made, the question whether the thing can be removed or not without injuring the land. The term “*fixtures*,” however, seems generally to have been used with reference to articles which in and of themselves, and irrespective of the manner in which they are fixed to the realty, whether real or constructive, are of a chattel nature, and which have been actually or constructively affixed either to the soil itself or to some structure legally constituting a part of the land.

Judge Campbell, of the Michigan Supreme Court, in delivering the opinion of the Court in the case of *Wheeler vs. Bedell* said: “There is no universal test whereby the character of what is claimed to be a fixture can be determined in the abstract. Neither the mode of annexation nor the manner of use is in all cases conclusiye. It must usually depend on the express or implied understanding of the parties concerned.”

What we understand by actual annexation to the land is when the article is fastened, fixed, or set into the land, or into some such erection as is unquestionably a part of the realty. Fence posts set in the ground, fences laid up, locks, iron stoves set in the brick work, window blinds, gates, doors, afford examples of actual fixtures. There are some articles which are considered as constructively fixed to the land. For instance, it has been held that manure made on the farm in the ordinary course of husbandry, lying in heaps about the barn, is a part of the land, and the seller must not take it away.

An Irishman, having sold his farm, carried away the manure from around his stable. The purchaser of the farm sued him for its value, claiming it as a part of the land. The court having rendered judgment against the Irishman, he inquired, “Your Honor, may I ax you a question?” “Yes,” said the court. “Is my mule personal property?” “Yes.” “Is my hay and corn personal property?” “Yes.” “Then I would like to have your Honor explain how personal property can eat personal property and produce real estate.”

The true criterion of an irremovable article consists in the united application of several tests: 1st, Real or constructive annexation of the article in question to the realty; 2d, its appropriation or adaptation to the use or purpose of the land with which it is connected; and 3d, the intent of the party in putting it on the land to make the article a permanent accession to the freehold; this intention being inferred from the nature of the article, the relation and situation of the party placing it there and the policy of the law in relation thereto, the structure and mode of the annexation, and the purpose or use for which it was put there. Whether an article is a fixture or not, and passes with the land as between the seller and purchaser, depends in a great degree upon the facts of each case, and what ought in fairness and honesty to be implied. I should say that fence posts corded up, patent fence not in use, and cord-wood were personal property, and might be removed by the seller. But stones piled up, if they were taken from the land, and were piled up for more convenient husbandry, would pass with the land, and the seller would have no right to remove them. In one case it was held that when the miller had taken a stone out of the mill to pick it in order to make it grind better, although it was severed from the mill, yet it remained part and parcel of the mill, and passed with it.

As I have said, it is easier to furnish examples than give an accurate

definition of what constitutes constructive annexation, or a satisfactory reason in some cases. Your wheat or corn, when growing, is a part of the land, and passes with a conveyance to the purchaser; but if it has been cut, threshed, and stored away in the barn or granary, it is personal property and does not pass; neither do your cattle or horses, though grazing on the farm, pass to the purchaser of the farm.

I will give a few examples of what have been held by the courts to be fixtures: Steam engines, boilers, fire-grates, bolted and secured on permanent foundations; bathing tubs and lead pipe fastened to the floors and walls of a dwelling with nails; furnaces connected with the house; stills and kettles set in brick work; gas fittings; an iron safe let into a brick wall and surrounded with brick and mortar. So of a threshing machine fixed by bolts and screws to posts let into the ground; cider mill and press, the press standing upon cross sills lying upon bed sills resting on flat stones in the ground; a cotton gin fastened to the house by nails and braces; a water pipe through which water is supplied to the house. But a planing machine, fire pump, saw benches and saws worked by hand, being complete in themselves as machines, as were also the copper pipes for steaming hubs, all being of equal use and value wherever wanted, affixed to the building only for convenience in using, and capable of removal without injury to the building or to themselves, were held to be chattels and not a part of the freehold.

In our own State it has been held that machinery not made expressly for use in the building in which it is placed, but capable of beneficial use if removed and set up in some other building, is personalty or realty according to the intent or understanding of the parties fairly deducible from the circumstances. The general rule is that all fixtures, whether actually or constructively annexed to the realty, pass by a conveyance of the freehold where there is nothing to indicate a contrary intention; and it makes no difference that the sale is made by the owner himself or by virtue of an execution or mortgage foreclosure.

I would say, in conclusion, that with respect to many articles which may be placed upon the farm, in the absence of any specific intention on the subject whether the article in controversy is or is not in law a part of the land and so goes with the land to the grantee, the cases are numerous and are involved in considerable confusion, and it sometimes requires one to act according to the golden rule in order to keep out of uncertain litigation.

LECTURE NUMBER SIX.

I am persuaded that when I speak of common law, as distinguished from statute law, I am not fully understood. A man for whose intelligence and culture I have a very high appreciation asked me the other day what I meant by the common law, and inquired very earnestly if all the law was not to be found in the statutes. It would seem, therefore, quite proper, that I should explain.

The common law is a system of rules which have been adopted by the universal consent and immemorial practice of the people without receiving the express authority of the legislative power. It is derived from the common law

of England and the practice and decisions of our own courts. It is to be found in the reported decisions of the courts, and in the written volumes of eminent jurists and law writers like Kent, Storey, Cooley, and others. These rules are supposed to be founded upon the divine attributes of truth and justice, and the nearer we approach to these attributes in our dealings with our fellow men the nearer we act in accordance with the precepts of the common law. Truth and justice are founded upon a rock that time cannot destroy. There are precepts the observance of which renders us acceptable in the sight of Him unto whom all hearts are open, all desires known, and from whom no secrets are hidden. There is a charm in truth which draws and attracts the mind continually towards it. In the ancient mythology of Rome truth was called the mother of virtue, and was depicted with white and flowing garments. Her looks were cheerful and pleasant, though modest and serene. She was the protectress of honor and honesty, and the light and joy of human society. A correct application of these divine attributes to a given controversy is, as a general thing, a solution of the law of the case. It requires the exercise of good judgment and common sense, and we say that one lawyer is better than another, other things being equal, in proportion to his better judgment and common sense, or what we call "hoss sense."

The table of weights and measures which we learned when we were boys, from old Duball's arithmetic, was not prescribed by any statute; it was and is a part of the common law, because it had been adopted and used by the people from time immemorial. We learned from this table that sixteen ounces make one pound, three feet make one yard, and one hundred and twenty-eight solid feet make one cord; and when you buy a pound of butter or a pound of wool or a yard of cloth, or a cord of wood, you expect to receive weight and measure according to this table, and he who is short in his weight and measure is a fraud, and you do not hesitate to denounce him as such. It is not because you find this table of weights and measures in the statutes. It is not there. They are adopted by the consent of the commercial world, and are, therefore, a part of the common law of the land.

A cord of wood means a pile eight feet long, four feet high and four feet wide, snugly put together, so as to make one hundred and twenty-eight solid feet. You may pile it so loosely or make it so short as to deceive him who purchases, and give him for a cord only one hundred feet. This is a fraud; and the common law denominates it the crime of obtaining money upon false pretenses. The statute steps in and fixes the penalty for this crime at not more than ten years in the penitentiary. Take the matter of promissory notes and bills of exchange. These are in a great measure the creatures of the common law. The statutes contain but few provisions concerning them, and these provisions are generally modifications of the common law. The duties and obligations pertaining to the parties to these important commercial instruments are mainly found detailed in the works of eminent writers on the subject. These instruments, when properly executed, pass from one to another, and are negotiated, bought and sold, and perform an important part in the commercial transactions of the world. If you give a promissory note to a person with whom you are dealing, he is liable to dispose of it, take it to a bank and get it discounted, or trade it off for groceries to the merchant with whom he is dealing; and it is very important to the security of such transactions that it should be subject to no equities as between the holder and the maker.

The common law, therefore, provides that no matter what may be the equities or private understanding or agreement between you and the person to whom you give your note—no matter what claim, by way of set-off or otherwise, you may have against the original payee of the note, one who buys it or becomes the holder in good faith, before maturity, without any notice of your equities, takes it relieved of all these equities.

It frequently happens that some vendor of patent rights or peddler of some other worthless truck by lying and fraud obtains the note of a farmer due sometime hence, and immediately sells it to a bank or broker. The broker knows nothing of the swindle, and is a holder in good faith, having paid a valuable consideration. The consequence is that the farmer is compelled to pay the uttermost farthing, no matter how grievously he may have been swindled in his patent right, or other truck speculation. This sort of business has become so common, by reason of the facility by which farmers may be imposed upon by scoundrels who ply that business among them, that the Legislature has endeavored, as far as possible, to protect them, without changing the common law.

The statute provides that whenever any promissory note shall be given, the consideration of which shall consist in whole or in part of the right to make, use, or vend any patent invention, or inventions claimed to be patented, the words "Given for patent right" shall be prominently and legibly written or printed on the face of such note, above the signature thereto. This is to warn everybody to whom the note is offered. Therefore, if the farmer who gives his note for a patent right, will see that these ominous words are prominently and legibly written or printed on the face of it, above the signature, he will have a defense to the note in case his trade proves to be a swindle, as is usually the case. How many farmers will observe this statutory precaution, remains to be seen. Indeed, if every farmer, when he gives a note, would write on his own signature what it is given for, it would be very apt to save him much serious trouble.

Take another illustration. The statute does not point out the duties and obligations pertaining to the farmer and his hired man. These are mainly regulated by the common law. Your obligations respecting your hired man are not confined to the simple payment of his stipulated wages, by any means. As a general rule, you are liable for any injury occasioned by the negligence or unskillfulness of your hired man in the course of his employment; and sometimes even when he goes contrary to your orders.

In one case where a hired man drove his employer's team along a public street so negligently that it came in collision with a carriage, and thereby caused the horses attached to the carriage to take fright and run away, doing serious damage, it was held that the employer was liable. So, when a farmer sent his hired man to cut timber in a designated direction upon his land, and the hired man inadvertently cut timber upon the land of an adjoining neighbor, it was held that the farmer was liable for the trespass. So, when one sent his son for his cattle in a certain pasture, and the boy not only drove home his father's cattle but two of his neighbor's heifers, it was held that the father was liable. So, when a man was employed to clean out a certain garret, carelessly threw a keg out of the window, which fell on the head of a boy and injured him. So, when a hired man in the course of his employment obstructed the highway from which a traveler received an injury, the employer was held liable for damages.

Sometimes the current of the common law changes. It may run for many

years in a certain direction until finally some man of common sense and superior genius will discover that it works injustice in certain cases and will demonstrate it by a course of reasoning which is irresistible that it is liable to work injuriously. This result will be a change in the opinion of courts and eminent writers. For more than two hundred years it was held in all the courts, both in England and this country, that if one hired a man for a certain time and he quit before his time was out without good cause, he could not recover wages for what time he had actually worked; that having broken his contract he could recover no compensation.

Some fifty years ago a farmer in New Hampshire hired a man for a year. The man worked eleven months, and quit; the farmer refused to pay him anything. He brought suit for his eleven months' work. According to the common law, as it had been held for generations, he was not entitled to recover anything. The case was taken to the supreme court, and there Judge Parker gave it as his opinion that the man was entitled to recover the value of his eleven months' saving, deducting the damage to the farmer in consequence of his quitting before his time was out. The whole subject was fully and ably examined by Parker, and the court came to the following conclusion, which has since been regarded as manifestly just and sensible:

When a person undertakes to pay upon a special contract for the performance of labor, he is not liable to be charged upon such special contract until the money is earned according to the terms of the agreement, and where the two parties have made an express agreement the law will not imply and raise an argument different from that which the parties have entered into. In case of a failure to perform such special contract by the fault of the party contracting to do the service, if the money is not due, by the terms of the special agreement, and the nature of the contract is such that the employer can reject what has been done, and refuse to receive any benefit from the past performance, he is entitled to do so, unless he has before assented to and accepted of what has been done, and in such case the party performing the labor is not entitled to recover, however much he may have done. But if upon a contract of such a character a party actually receives useful labor, and thereby derives a benefit and advantage over and above the damage which has resulted from the breach of the contract by the other party, the labor actually done and the value received furnishes a new consideration, and the law thereupon raises a promise to pay to the extent of the reasonable worth of the excess. If in such case it be found that the damages are equal to or greater than the value of the labor performed, so that the employer has not upon the whole case received a beneficial service, he can not be made to pay for such service. Such is now the well settled rule of the common law on this subject.

I have thus deviated, for the time being, from the course I was pursuing, in order to explain very briefly and as clearly as I could what we understand by the common law. Having thus endeavored to explain, I shall resume the course which I have indicated in former conversations.

LECTURE NUMBER SEVEN.

DISTRAINING BEASTS DOING DAMAGE.

If you find your neighbor's cattle unlawfully on your premises doing damage, you have two remedies—you can sue the owner of the cattle, or you can distrain them. If the owner is well known to you and is abundantly responsible, you would probably pursue the first remedy. If you had any doubt about this, you would seize the cattle and hold them for the damage. The right to distrain cattle doing damage existed at common law, and was not introduced by statute. It sprang from a felt necessity for a summary and direct remedy against the beasts committing damage, and also for some guard against possible incentive to do hurt to them or putting them out of the way. The owner might not be discoverable, nor be in a situation to be reached by process, or if discovered and within reach of process there might be impediments in the way of any redress by an ordinary action for damages. And if the beasts could not be held, the injured party might be moved to misuse them or put them in a way to be lost to the owner. The right to distrain beasts doing damage, with several incidents, being established by the common law, statutes have been passed to regulate its exercise.

The right being admitted, it was needful to frame guards, not only against wrongs likely to be done under color of it, but also against violations likely to be committed against the right itself, under color of the very guards intended merely to prevent its being resorted to as a cloak for wrong.

Accordingly, it is provided by the statutes of Michigan that, when any person is injured in his land by any sheep, swine, horses, asses, mules, goats, or neat cattle, he may recover his damages in action of trespass or trespass upon the case, against the owner of the beasts or against the person having the care and control of such beasts, or by distraining the beasts doing the damage.

You must bear in mind, however, that if the beasts shall have been lawfully on the adjoining lands and shall have escaped therefrom in consequence of your neglect to maintain your part of the division fences, the owner of the cattle is not liable, and you have no right to distrain them.

The right to distrain beasts does not depend upon the particular kind of injury done on the place where it is committed. Swine in one's barn, eating corn, may be distrained. They must be taken while doing damage, and not after it is done or while they are off the land. And after they have been distrained they must not be beaten, nor worked, nor used, nor abused.

The beasts so distrained for doing damage shall be impounded or placed in the township pound, if there be one, and the man who distrains them must leave with the keeper of the pound a memorandum in writing, signed by him, stating the cause of distraining and the sum that he demands from the owner for the damage done by the beasts.

In this western country there are but very few towns in which pounds are provided. Accordingly it is provided by statute, that, if there shall be no public pound within the township, the beasts shall be impounded in some suitable place, under the immediate care and inspection of the person who distrained them, and he shall furnish them with suitable food and water so long as they remain impounded.

When the beasts are impounded, shut up, confined, within twenty-four hours thereafter you must give notice thereof in writing to the owner or person

having the care of or control of them, if known to you and living within six miles from the place where the beasts are confined, which notice shall be delivered to the party or left at his place of abode, and shall contain a description of the beasts and a statement of the time, place, and cause of impounding them. If there is no person entitled to notice, you are required within forty-eight hours to cause a written notice, containing a description of the beasts and a statement of the time, place, and cause of impounding to be posted up in three public places in the township, and in a public place in each of any two adjoining townships, if within four miles from the place where the beasts were taken.

In case notice is given by posting, if no person shall appear to claim the beasts within seven days after the day the beasts are distrained or shut up, a like notice must be published for three successive weeks in some public newspaper, if any then shall be published within twenty miles of the place where the beasts are shut up, the first publication to be within fifteen days after the day of seizure and confinement.

Now understand, that if you intend to pursue this remedy in case of beasts doing damage, you must strictly comply with all the requisites of the law. If, however, you should choose to do so, you can relinquish this proceeding and pass the cattle over to the owner or keeper, at any time before you have received satisfaction for the damages sustained, and bring the action of trespass, or trespass on the case, as you may see fit, taking heed that you have properly cared for the cattle and have complied strictly with all the requirements of the law so far as you have pursued your remedy by distraint.

If the owner or keeper of the cattle shall be dissatisfied with your claim, he may have the amount ascertained and determined by two disinterested and discreet persons, to be appointed and sworn by a justice of the peace; and the sum determined by them you are obliged to receive and restore the beasts to the owner or keeper.

But if the sum you claim for damages shall not be paid within fourteen days after notice of the impounding or shutting up shall have been given, or after the last publication of such notice in the proper newspaper, and the amount shall not have been determined by men appointed by the justice of the peace, you must then apply to a justice of the peace and obtain a warrant to two disinterested and discreet persons to be appointed and sworn by the justice; and the persons so appointed and sworn shall ascertain and determine the sum due for damages, costs, and expenses for which they are shut up and detained, including a reasonable compensation for their services.

If the sum so found to be due shall not be forthwith paid, you must cause the beasts to be sold by auction, in the township where they were impounded, first advertising the sale by posting up a notice thereof in three public places in the same township, at least five days before such sale; and this notice should specify the time and place of sale. The proceeds of the sale, after paying all the damages, costs, and expenses, with the charges for advertising, if any, and the selling, must be deposited in the treasury of the township, for the use of the owner, in case he shall substantiate his claim thereto within two years from the time of sale.

The most punctilious regularity is necessary in making a distress for damages done; and the statute which I have given must be strictly complied with. Very often, the least deviation from the law in taking and disposing of beasts will subject the party to a replevin or an action of trespass or trover for the value of the beasts distrained.

Whatever makes a man a trespasser from the beginning, in pursuing this remedy, as by an unlawful impounding or shutting up, strips him of all right to protection in anything which he has done, and constitutes him a wrong-doer throughout and liable for damages.

You will notice I have said nothing about the taking up of stray beasts or cattle. I have simply confined this conversation to the distraining of beasts doing damage.

It is a remedy which is becoming more and more prevalent as the country grows older, as a means of prompt redress for those trifling yet oft-repeated injuries which will hardly brook "the law's delay" consistently with other concerns. I have, therefore, mainly quoted from the statutes of the State in which you and I live. These statutes, while they may be perfectly familiar to any lawyer, and where he can put his hand on them at any moment, may not be quite so accessible to most of you. I am not dropping these conversations with the Farmers' Club for the benefit of lawyers who have large libraries at hand; but to call your attention to what may be considered important practical questions in common life, and I shall endeavor to put them in such language as that you may understand them.

LECTURE NUMBER EIGHT.

BOUNDARY LINES.

Questions frequently arise among farmers respecting boundary lines. Corner posts or monuments frequently disappear, and disputes arise, and a new surveyor is called in to resurvey the land. Then disputes sometimes arise after long acquiescence in an established line. Fences have been built on what was supposed by both parties to be the true boundary line, and the property occupied, improved and sold with reference to the line thus established. Suddenly some adjacent owner discovers, or thinks he discovers, that the line is not correct, that the fence or line as claimed is on him, and that he is being deprived of a portion of his rightful inheritance. A surveyor is called upon, who undertakes to regulate the matter. It is always competent for the parties in such cases to choose a new surveyor and agree to abide by the new survey.

A dispute of this kind arose in Macomb county in 1845. The parties, by mutual agreement, not in writing, employed a surveyor, who established the line between them, which was acquiesced in, and the parties occupied and improved the land with reference to the line so established until 1864, when one of them became dissatisfied and claimed that the line was on him about six rods, and brought suit to recover. It was claimed that the agreement under which the line was established in 1845 was void and of no binding force because it was not in writing. The court held that when there has been an honest difficulty in determining the lines between two neighboring proprietors, and they have actually agreed by parole upon a certain boundary as the true one, and have occupied accordingly, with visible monuments or divisions, the agreement long acquiesced in shall not be disturbed, although the time has not been sufficient to establish an adverse possession. It has been repeatedly held by the courts that a boundary line long treated and acquiesced in as the

true line ought not to be disturbed on new surveys, and that fifteen years' recognition and acquiescence are ample for this purpose. In view of the great difficulty which often attends the effort to ascertain where the original monuments were planted, the peace of the community requires that all attempts to disturb lines with which the parties concerned have long been satisfied should not be encouraged. Long-established fences are better evidence, as a general rule, of actual boundaries settled by practical location than any survey made after the monuments of the original survey have disappeared. Long practical acquiescence in a boundary between the parties concerned may constitute such an agreement as to be conclusive even if it had been erroneously located.

Surveyors have no more authority than other men to determine boundaries. All bounds and starting points are questions of fact. Surveyors may or may not have, in certain kinds of cases, means of judgment not possessed by others; but the law cannot and does not make them arbiters of private rights; and unless the boundary lines of one's farm have been settled by long acquiescence by those who are interested, or were interested, it must be settled, like any other disputed question, by the law and the facts.

It will thus be seen that a man may acquire land by long, honest, and uninterrupted possession or use, during the time required by law. This is called obtaining title by *prescription*. This term is used to express that operation of the lapse of time by which obligations are extinguished, or titles protected.

The law raises the just presumption that where he who owns land has for a long time neglected his rights, without any good reason to prevent him from asserting them, as when he has suffered you in good faith to occupy a strip of land which really belonged to him, and which you supposed was a part of your farm, he is presumed to have abandoned it, and that you have the title. This is perfectly just, both on account of the parties, and for the purpose of protecting society against the disorders which would arise did a different rule prevail. The law secures to the owner of land the rights which he has upon condition that he will at all times assert them, so as not to induce another to fall into an error respecting them. If for a sufficient length of time he neglects them, so as to put in peril the rights of another, he will not be allowed to reclaim them. The possessor who has in good faith acquired such possession, has a right superior to the claimant. It will be well to bear in mind, however, that no rights can be acquired by *prescription* against the public; so that, if your fence is in the public highway, you may some day be obliged to move it.

LECTURE NUMBER NINE.

In almost every farming community there is one or more individuals who have a passion for trading horses. The more proficient of these are called "horse jockeys." They are not always to be relied upon in what they say about a horse when they are making a trade. Indeed, I have sometimes thought that if there is any business transaction in which a farmer will prevaricate, it is a horse trade. It is this disposition or propensity to trade horses which gives rise to more or less litigation from the country.

If you are defrauded in a horse trade, you have two legal remedies. You

may tender the horse which you received to the man you traded with, and demand the horse you let him have, and if he refuses you can bring replevin, or you can keep the horse and sue him for the damage; in which case you may recover the difference between the value of the horse you obtained as he is, and what he would have been if he had corresponded with the recommendation.

If a man trades me a horse or sells me a horse, and there be any unsoundness, breachiness, trickiness, or other defect unknown to and unperceivable by me, but which is known to him; and if he represents the animal free from defect, or even forbears to mention such defect, but intentionally conceals it from me, he is guilty of fraud. The well-established rule in such cases is that one party must not practice any artifice to conceal defects, or make any representations for the purpose of throwing the person with whom he is dealing off his guard. If in trading horses you, by your acts, produce the impression upon the person with whom you are trading that your horse is sound when you know he is not, you are perpetrating a fraud.

When, however, the means of information relative to the facts and circumstances affecting the value of the animal are equally accessible to both parties, and neither does or says anything tending to impose upon the other, it is called a fair trade. It is not necessary that one should disclose any superior knowledge which he may have over the other as to those facts and circumstances. There is no breach of that implied confidence which men are presumed to repose in each other that one party shall not profit by his superior knowledge of the quality of an animal open to the observation of both parties, or equally within the reach of their ordinary diligence, because neither party is expected to repose in any such confidence unless it is specially tendered. Each one in ordinary cases judges for himself, and relies confidently and sometimes, perhaps, presumptuously upon the sufficiency of his own knowledge, skill, and diligence.

The common law affords to every one reasonable protection against fraud in dealing, but it does not go to the extent of giving indemnity against the consequences of indolence and folly or careless indifference to the ordinary and accessible means of information. The law requires the man who trades horses to apply his attention to particulars which may be supposed to be within the reach of his observation and judgment, and honesty and fair dealing require that the other party should communicate those particulars and defects which he knows all about, and which can not be supposed to be immediately within the reach of such attention. If the trader be ignorant of any unsoundness or other defect which the horse may have, a mere representation of soundness will not render him liable. If it is intended to make him accountable under such circumstances he had better insist upon a warranty that the horse is sound or free from such defect. A general warranty is therefore frequently required on horse trades.

Such warranty extends to all defects, except such apparent failings as are perfectly obvious to the senses, and do not require any kind of skill or pains to discover. A general warranty of soundness will be of no avail against a defect which you know to exist. Though if the trader say or do any thing whatever with an intention to divert your observation from such defects, he is guilty of a fraud. And fraud may be made out, not only from deceptive assertions, and false representations, but from facts, incidents, and circumstances, which may be trivial in themselves, but decisive evidence in a given

case of a fraudulent design. A man may be in a horse trade not only with his mouth, but with his hands or feet. And, indeed, his very silence may sometimes be a grievous falsehood. Men know perfectly well how to be honest in a horse trade, but if there be any transaction where total depravity is likely to assert itself, it is in that business. No particular form of words is necessary to constitute a warranty. A positive and unequivocal assertion, or affirmation concerning the horse, which is relied on by the other party, and is understood by the parties to be an absolute assertion and not a mere expression of opinion, is as a general thing a warranty that the horse is as stated.

The word warranty need not be used. If a man should say in a horse trade, "I promise you the horse is sound," or "the horse is not lame, and I would not be afraid to warrant him," it is enough to establish a warranty. So if he say, "You may depend upon it, the horse is perfectly quiet and free from vice." So when one said on a horse trade, "I never warrant, but the horse is sound so far as I know," it has been held to be a warranty upon which an action could be maintained, provided the party could show that the horse was unsound to the knowledge of the one making the assertion.

If there be no warranty, and a man trade a horse for such as he honestly believed him to be, without fraud or deception, the law will not imply that he traded it upon any other terms than such as were stipulated in the bargain. It is your fault if you do not insist upon a warranty. It must be remembered however, that in case of warranty you can not return the horse and recover the one you exchanged. This can be done only in case of fraud, false representations, or deceit in the bargain.

The best way in horse trades, as in other transactions, is to act with that fairness and plain dealing which becomes an honest man, however difficult it may be.

LECTURE NUMBER TEN.

HOW TO CROSS A RAILROAD TRACK.

It is well settled law that a railroad track is itself a warning of danger, and that persons about to cross a railroad track are bound to recognize and take notice that it is a dangerous place, and make diligent use of their senses of hearing, seeing, and perhaps even of feeling, to ascertain whether a train or engine is in dangerous proximity before attempting to cross. If they neglect to do this, but blindly venture on the track without every reasonable precaution, it must be at their own risk. I would therefore solemnly advise every person about to cross a railroad track to stop and carefully investigate, especially if there are embankments or other obstacles in the way of a full view of the track for a considerable distance each way. And when the peculiarities of the situation require such precaution, I would advise him to get out of his wagon and approach and look along the track in both directions.

In most cases where recovery is sought against a railroad company on account of injuries received at crossings by travelers and other wayfarers, the question of primary importance is, whether the negligence of the party injured contributed to the injury. When the traveler's want of ordinary care is the proximate cause of the injury, he cannot recover, though the railroad company

may also have been guilty of negligence. And even though the managers of a railroad train may have omitted to observe some positive statutory requirement, such as ringing the bell or blowing the whistle, it will not excuse want of ordinary care on the part of the traveler. The failure to make use of proper means to ascertain whether a train is approaching before venturing upon the track, is pronounced by the courts to be negligence, as a matter of law. A prudent man in the presence of danger, naturally and ordinarily, makes use of his faculties to ascertain and avoid it; and he who does not do so, when he has good reason to apprehend danger, fails to exercise the ordinary and reasonable care which the law requires of him, and if he is injured he must abide the consequences, and can recover no damages.

It is hardly possible that a person of ordinary intelligence and observation can approach a railroad crossing without knowing it. There are generally manifest indications of it. A signal is conspicuously posted and plainly written: "Railroad Crossing. Look out for the cars;" and he who knowing, or who ought to know, that he is approaching a railroad crossing, advances to the point of intersection without looking or listening, is a reckless, imprudent person, and if he is knocked into eternity by the lightning express in the twinkling of an eye, his friends had better see his remains decently buried and be silent. Such reckless conduct in the presence of danger will constitute that negligence which will preclude any recovery for the injury sustained. No neglect of duty on the part of the railroad company will excuse one approaching a crossing from using the senses of sight and hearing, and, if prudence requires, even of feeling, when these may be available. And where the reasonable use of either of such faculties would have given sufficient warning to enable the party to avoid the danger, and he fails to use them, this will be conclusive proof of negligence. If he be deaf and can not hear, he must look. If anything obstructs his view of the track in either direction he must advance with caution, and, as I said before, in such cases he had better stop and investigate. Trains very seldom slacken their speed at a crossing. They are not usually required to do so. The law recognizes the fact that locomotives and heavy trains cannot be suddenly stopped, or turn to the right or left, like a foot passenger or a team and wagon upon the ordinary highway. They necessarily have the preference at crossings. A train running at the rate of thirty miles per hour will pass over forty-four feet every second of time. So that, if you should see a train coming, care and caution are required of you. It is very difficult to determine the speed of a train when it is approaching you, and, if it is anywhere in sight, it would be quite a proper thing to do to wait until it passes before attempting to cross.

Where a traveler undertook to cross a track upon the supposition that the train had passed at the usual hour, when, in fact, it was behind time, it was held insufficient to excuse him from pausing to look or listen. Instead of looking at his watch, he should have looked for a train.

A few years ago a woman sued the Lake Shore & Michigan Southern railroad company for injuries received by her at a crossing in Branch county by a collision between the locomotive of a passenger train and the wagon in which she was riding. She was riding with the owner of the team and wagon, who was driving, or undertook to drive, across the track. It was claimed that the accident was caused by the negligence of the company in having their wood piled so as to obscure the track, and that trains coming could not be seen by persons approaching the crossing. They were in a lumber wagon. She was a mere passenger. As they approached the track the woman

remarked to the driver that it was a dangerous place. He replied that it was, but looked at his watch, and said there was no danger, as it was an hour past train time, and drove on. They did not stop to listen for the cars, nor did it appear that they looked one way or the other, either up or down the track, until an instant before they were struck. The driver was killed, the woman thrown some distance against the fence and badly injured, and the wagon torn to fragments. The court held that the negligence of the driver of the team was such that no recovery could be had; that the negligence on the part of the person owning and driving the team affected the right of the woman riding equally as though it were her own negligence. Therefore it would seem, if you should happen to be riding with a careless, negligent driver, you had better get out just before you come upon a railroad track and walk, unless you are sure that no train or engine is approaching, as you will be held in such a case responsible for the carelessness of the driver, even though you have a free ride.

LECTURE NUMBER ELEVEN.

LAW OF THE ROAD.

We have two kinds of public roads: First, such as are laid out and established by the government, State, county, or district, and are kept in repair by the same authority; and, secondly, those which are made and laid out by authority of law by a corporation or company of individuals, and which are kept in repair by them.

The public have the use of a road of the first class, but the owners of land over which it passes have a fee in such road, subject to the easement of the public; and the owners of the sides have, *prima facie*, a fee in it to the center of the road, subject to the public right, except where the boundary excludes the highway. The proprietor of the soil of such a road is therefore entitled to all the fruits which grow by its side, and to all the mineral wealth it contains; and whenever such road is vacated, that is, abandoned by public authority, the easement of the public is gone, and the land discharged from it reverts to its former owner.

Railroads, turnpikes, plank roads, gravel roads, and other ways, authorized by the government to be made by corporations or public companies, are the second class of public roads. These are made and kept in order by the companies to which they respectively belong, but the public have a right to travel over them, and no citizen can be prevented from going on them in such a way as is regulated by law. If one complies with the law and the rules of the road, as legally established and prescribed, he has a right to travel over this class of roads.

Respecting such public roads as are laid out and established by the government, State, county, or district, I will say that any act or obstruction which unnecessarily incommodes or impedes the lawful use of such highway by the public is a common law nuisance, and may be abated by any one whose passage is thereby obstructed, or the person causing or maintaining such obstruction may be prosecuted or may be sued for damages by any one injured thereby. Every one, however, who assumes to judge of and remove an obstruction to a

highway, upon the ground that it is a nuisance, does so at his own risk, and if he misjudges he is liable for damages. He should be careful, therefore, how he takes the law in his own hands.

It is the duty of travelers upon a public highway, for the purpose of avoiding collision and accident, to observe due care in accommodating themselves to each other. The law imposes the duty upon every one, when on a public highway, of using reasonable care and diligence to avoid threatened danger, and to protect himself and property therefrom, and for this purpose he is bound to use all his senses, and one who does not use his senses is guilty of what the law terms contributive negligence, if he be injured by the negligence of another. A foot traveller who attempts to cross a public highway ahead of an approaching team, under circumstances requiring a close estimate of his chances of crossing safely, cannot recover for injuries sustained in consequence of the negligence of the driver of the team, because his own negligence contributes to the injury. He must himself be without fault. In the use of a public highway you have a right to expect from others ordinary prudence, and to rely upon that in determining your own means of using the road. When a driver attempts to pass another going in the same direction he does so at his peril. At least he must be responsible for all damage which he causes to the one whom he attempts to pass, and whose right to the proper use of the road is as great as his own, unless the latter is guilty of such recklessness, or even gross carelessness, as would bring disaster upon himself.

I have observed that it is the duty of travelers upon highways to observe due care in accommodating themselves to each other. To subserve this purpose the rule in England is that, in meeting, each party shall turn to the left. In this country the law requires them to bear to the right. The reason of this difference is in the character of the public highways. In England the danger is much more from collision with the passing team than from obstructions or embankments. Hence the driver should be where he can observe the greatest peril. This rule, however, does not apply to equestrians or foot passengers.

The statute of this State provides that passing teams shall bear to the right of the middle of the traveled part of the road. This means that part which is wrought for traveling, and is not confined simply to the most traveled wheel track.

And it has been held to be no defense to an action that the party had no design to injure, that he attempted to prevent a collision, that the road on his side was rough and rutty, and that it was more difficult for him than for the other party to turn out. Unless the obstacles to turning out are insuperable, or extremely difficult, he is without excuse.

A traveler on horseback meeting another horseman, or a vehicle, is not required to turn in any particular way to avoid collision; he must exercise due care under the circumstances. A person on foot or on horseback cannot compel a teamster, who has a heavy load, to leave the beaten part of the road, if there be sufficient room to pass; and this rule applies where a person on horseback meets a loaded buggy. Where a horseman or light vehicle can pass with more safety to the left of a heavily loaded wagon, it is their duty to give way, and leave the choice to the more unwieldy.

Where a child, of such tender age as not to possess sufficient discretion to avoid danger, is permitted by its parents to be in the highway without any one to guard it, and is there run over by the carriage of a traveler and injured, no action will lie against the traveler, unless the injury was voluntary, or arose from culpable negligence on his part; and although the child, by reason

of its tender age, is incapable of using that ordinary care which is required of a discreet and prudent person, the want of such care on the part of the parents or guardians would be attributed to the child. In such a case, however, greater caution would be expected of the traveler than in the case of an adult.

On the question of whether a party is guilty of negligence, the law would consider the age and sex of the person. The same degree of care and skill in driving along a public highway is not expected of a child or a woman as is expected of a man of mature years. As in every other situation, the degree of care exacted from a traveler on a public highway is in proportion to the danger to others which attends his particular situation.

Where a road is impassable by reason of mud-holes or other serious obstructions, the pulling down of a fence at the side of the road and passing over the adjoining field has been held to be a necessary and justifiable act.

LECTURE NUMBER TWELVE.

LEGAL AND EQUITABLE RIGHTS OF THE FARMER'S WIFE.

The common law idea of marriage was that the husband and wife became one person, and that person principally husband. They reciprocally engaged to live with each other during their joint lives—to assist each other, and to share a common destiny as to the good or evil which should happen to them. The husband is bound to receive his wife at his home, and treat her there as a husband should do; that is, furnish her with all the necessities and conveniences which his fortune enables him to do, and which her situation requires; but this does not include such luxuries as, according to her fancy, she may deem necessities. For instance, an ordinary farmer would not be expected to furnish his wife with a four hundred dollar seal-skin sacque, or a set of diamonds, or a ball dress worth eighty dollars, or pipes, tobacco, and cigars.

By the term necessities is meant all such things as are proper and requisite, considering his circumstances and her situation. Whenever the husband, by his misconduct, has obliged his wife to buy necessities upon his credit, he must pay for them, though he may have previously warned the tradesman, by notice in the newspapers or otherwise, not to trust her; but if her own misconduct has reduced her to want, he cannot be charged. It is the duty of the husband to love his wife, and to bear with her faults, as she ought to bear with his; and he is required to fulfill toward her his marital promise of fidelity, and can, therefore, have no carnal connection with any other woman without a violation of his obligations. He is bound to govern his house properly; he is liable for mismanagement, and he may be punished for keeping a disorderly house, where his wife had the principal agency.

Being the head of the family, the husband has a right to establish himself wherever he may please; in this he cannot be controlled by his wife; and he may manage his affairs in his own way. He may make whatever contracts may suit him, and acquire and sell property. The wife is bound to love her husband, to be faithful to him, to do all in her power to promote their common interest. She is bound to follow him wherever he may desire to establish

himself within the United States, unless by acts of injustice, or such as are contrary to his marital duties, the husband renders her happiness insecure.

While the common law regarded the husband and wife as one person, and that person principally husband, she yet retained sufficient personality to be hanged and otherwise punished for her own criminal acts, unless in cases where the crime is not bad in itself (*malum in se*), or committed in the presence or by the command of her husband. Where the wife commits a crime in the presence of her husband, she is presumed to have done it at his command, and is therefore not personally liable. This presumption is not always reliable, as where, in Michigan, a wife, participating with her husband in a robbery, choked a man while her husband picked his pockets, she was held to be equally liable with him for the robbery.

It was once considered that the husband might correct or whip his wife in order to bring her into subjection; this is now considered unlawful. The common law proceeded upon the hypothesis that a man would never be cruel to his wife. Indeed, man is the only creature in the wide world ever known to abuse the female. Dogs never do such things. Your male dog, however obedient to you in other respects, will die at your hands before he will bite or abuse the female dog at your command. He will yield to her his favorite bone rather than injure her, although she may be a stranger to whom he has never had an introduction.

In looking over a bill in chancery, the other day, filed by a woman against her husband for a divorce, on the ground of extreme cruelty, wherein she charged that her husband knocked her down and than tried to kick her in the face, I was forcibly reminded of what an old and experienced hunter once said when asked which was the most cruel and ferocious animal he had ever encountered. He said he had hunted grizzly bears in the Rocky Mountains, and lions in Central Africa, had been pursued by the black wolves of Russia, and had met the royal tiger in the jungles of Bengal, but the most ferocious, savage, cruel, bloodthirsty, and unrelenting animal he had ever encountered was civilized man. Other animals, he said, never molested him if he let them alone, unless when driven frantic by hunger. But civilized man would slay his own children, and cut the throats of innocent girls, from pure cussedness. Divorce on the ground of cruelty was unknown to the common law.

At the common law, when a women married, not only her person but all her personal property passed to the control of her husband. This right became absolute instantly upon marriage. As to her things in action, or property requiring some action to realize its full possession or enjoyment, such as notes and mortgages, the husband's right was qualified; such things did not vest in him until her consent reduced them to possession. His right was also subject to an important qualification known as the wife's "equity of settlement." This is thus defined: "If the husband wants the aid of a court of equity to enable him to get possession of his wife's property, or if her fortune be within reach of a court of equity, he must do what is equitable by making a reasonable provision out of it for the maintainance of her and her children." This equity arises only when the husband has to resort to the aid of the court to get possession of her property.

About forty years ago a revolution began as to the property rights of married women. Modifying laws were passed in Michigan, and gradually the march of legislative amelioration has extended to nearly every State in the union. It is not necessary to review these various changes in detail, especially as the laws of the states differ quite essentially. In 1855 the revolution in

Michigan was completed, so that married women are well nigh emancipated altogether from marital restraint so far as concerns their property, while the husband's own rights are exceedingly precarious.

It was enacted "that the real and personal estate of every female, acquired before marriage, and all property, real and personal, to which she may afterward become entitled by gift, grant, inheritance, devise, or in any other manner, shall be and remain the estate and property of such female, and shall not be liable for the debts, obligations, and engagements of her husband, and may be contracted, sold, transferred, mortgaged, conveyed, devised, or bequeathed by her, in the same manner and with the like effect as if she were unmarried." It was further enacted that "actions may be brought by and against a married woman in relation to her sole property in the same manner as if she were unmarried."

It will be observed that the statutes securing to a married woman her separate property have removed her common law disability, and give her all the powers as to such property as though she were unmarried. But they have no application to the interests the wife may have in the property of her husband. As to such interests, the common law disability remains, except as it is expressly removed by other statutes. She can sell and dispose of her property without his consent. If she owns the homestead on which he and she live, she can sell it over his head. If he owns it he cannot dispose of it without her consent. She can mortgage her own property, but he cannot mortgage his household furniture or farming utensils without she joins in the mortgage. If he dies she is entitled to the use of one-third of his lands for and during her life. If she dies he acquires no interest whatever in her real estate. Nobody will buy a foot of land unless she joins in the deed freely and voluntarily; but she can sell without his knowledge or consent. So that, respecting her individual property, the farmer's wife may be independent.

Prior to these statutes the sole deed of a married woman was void. She could not sell without her husband's consent, nor deed directly to him. Her contracts were void. She could neither give nor sell without his consent. Now she can make a note, sign a bond or mortgage, and be an independent party to a lawsuit, just like a man. If a man commits an assault and battery upon her, she can sue him in her own name for damages, and whatever damages she recovers becomes her own individual property. Indeed, so far as her property is concerned, the farmer's wife can do just about as she pleases. Some husbands are inclined to say to their wives what the Irishman said to the steam engine: "You may ploff and ploff, but, be jabers, you can't vote."

After forty years' trial of these statutes in relation to the rights of woman respecting her own property there seems to be no disposition anywhere to return to the old common law system. Experience and observation have demonstrated that these laws are wholesome and what they should be, and the case remains yet to be reported where a true woman has dissipated her property to the serious detriment of her family. We have among us a class of young men, and they are growing more and more numerous every day, who have no ambition but to live upon and dissipate the accumulations of others. These are fortune hunters. They profess to believe that any fool can inherit a fortune or marry one, but that it takes a man of genius, spirit, and energy to make his own fortune. There are, however, a great many young men left who are too ambitious to marry for the mere consideration of dollars and cents, who have faith in their own ability to make a fortune for themselves, and do not depend upon what their wives may have. Upon the whole, the

world is the gainer for extending to woman the right to control her own property; and I apprehend that the time is not far distant when she will be thought competent to be intrusted with the ballot.

LECTURE NUMBER THIRTEEN.

THE FARMER AND THE HIGHWAY.

I find it necessary to enlarge a little on this subject, on account of several communications which I have received from farmers concerning it.

The statute prescribes the method by which land may be taken for a public highway. It is generally upon the petition of a certain number of freeholders. Upon a proper petition, the highway commissioners are authorized to proceed and lay out a highway. All persons interested have notice in the manner prescribed by the statute, and can appear before the commissioners and be heard. When the road is laid out pursuant to the requirements of the statute, it becomes a public highway. It makes no difference where it begins or where it ends. There is also a provision of the statute for laying out private roads.

When a public highway is established and a part of the farm taken for that purpose, all use of the land thus appropriated, not inconsistent with its public use as a highway, remains with and may be enjoyed by the adjoining owner. His interest is such that he may maintain an action of trespass for its obstruction, or for ploughing up the road when not done in the course of repairing. He may sink water-courses below it, covering them so that the highway remains safe and convenient, and the public must respect his water-course, whether natural or artificial, and cannot shut it up. He may make approaches to the highway from the farm by bridges, provided he does not obstruct the public use. If the farmer owns a spring of water adjoining the highway, he is entitled to any and all uses of it which do not interfere with the public safety or obstruct or hinder public travel, and does not increase the public burden in making repairs. If the water may be allowed to flow upon the land of the owner, and the way can, at the same cost and with equal safety be maintained, this must be done. The right of the owner to the use of the spring under these limitations takes precedence of the right of the public to divert it to the lands of others, if the sole motive be to establish a public watering place. The right of way existing in the public is a right of passage along the highway, and not a right to get water either in streams or springs on the soil of the adjoining owner. The water is no part of the highway, and its use is not incident to the use of the highway.

The right of the public over a highway is, however, not confined to travel only, but it may construct drains, sewers, gutters, water-pipes, cisterns, wells, and reservoirs in the highways. While, as I have elsewhere said, the timber and grass found in public highways belong to the owner of the adjoining soil, in order to make the road passable it may be necessary for the authorities to remove them, but they belong to the owner, and when cut should be removed out of the way of the public. The public require a right of way only, and do not require the timber or grass taken off, although it may be necessary to remove the same. The public have a right, generally, to use such material

as may be found standing and growing in the public highway, for the purpose of repairs—that is, such material as may be properly used for that purpose. This right would not allow the cutting down of valuable shade trees, properly located.

One who digs a pit, or has a dangerous opening upon his own land adjoining a public highway, so that those using it with ordinary caution may fall into it, is liable to one who, by such use of it sustains injury thereby. As, when one left an unfenced hole upon his premises adjoining a highway, a person passing along at night fell into the hole and was injured, the proprietor of the hole was held liable for the injury.

I have said that a person traveling on a public highway which has become *fonderous* and impassable, has a right to remove enough of the fences on the adjoining land to enable him to pass around the obstruction, doing no unnecessary injury. Such right, however, is not to be exercised from convenience merely, nor when, by the exercise of due care, after noticing the obstruction, other ways may be selected and the obstruction avoided. But it is to be confined to those cases of inevitable necessity or unavoidable accident, arising from sudden or recent causes, which have occasioned temporary and impassable obstructions in the highway. What shall constitute such inevitable necessity or unavoidable accident must depend upon the various circumstances attending each particular case; and one must be governed by common prudence and common sense, having a due regard for the rights and interests of the adjoining proprietor.

In regard to what would constitute a lawful fence along the highway adjoining a farm, where the law makes it the duty of the farmer to build such fence, it is perhaps sufficient to say that what would be a lawful line fence or division fence would answer the law regarding a fence along the highway. Modern improvements in the mode of fencing have led to considerable inquiry on this subject. The statutes of this State provide that “all fences, four and a half feet high, and in good repair, consisting of rails, timber, boards, or stone wall, or any combination thereof, or other things which shall be considered equivalent thereto, in the judgment of the fence viewers within whose jurisdiction the same may be, shall be deemed a legal and sufficient fence.”

The question has arisen, and has been frequently asked, whether a barbed wire fence is a legal and sufficient fence within the meaning of this statute. I know of no statute or judicial decision which settles the question. I can, therefore, only express my individual opinion, that a barbed wire fence, four and a half feet high, in good repair, would meet the requirements of the statute. But suppose the fence viewers within whose jurisdiction your fence may be located should be called upon, and should say it is not—then what? And suppose, in another jurisdiction, the fence viewers should say it was—then what? The fact is that the Legislature which enacted the law knew nothing about wire fences. They had not then been in use. Therefore, we shall be obliged to await the judgment of the fence viewers—who are the pathmasters in your neighborhood—and the decisions of the Supreme Court. And, until the matter is settled, you only have my opinion that a barbed wire fence is a good, cheap, substantial, and, if properly built and in good repair, a legal and sufficient fence.

The statute makes it the duty of every overseer of the highways to cause all noxious weeds, within the limits of the highways in his district, to be cut down and destroyed twice in each year, once before the first day of July, and again before the first day of September, and the requisite labor shall be con-

sidered highway work. For any neglect or refusal to perform this duty, the overseer is liable to a penalty of twenty-five dollars.

The statute also makes it the duty of every owner, possessor, or occupier of land to cut down, or cause to be cut down, all the Canada thistles growing on the highway passing by or through such land, so often every year as shall prevent their going to seed.

It also authorizes the board of supervisors to make such by-laws and regulations as they may deem necessary for the destruction of noxious weeds within the several counties; so that the farmer is not obliged to cut down noxious weeds in the highway (except Canada thistles) unless there has been some action taken in that respect by the board of supervisors.

LECTURE NUMBER FOURTEEN.

THE FARMER AND THE TOLL ROAD.

Next to a good farm and a happy family is a good road to town and to market. A good, clean, substantial, nicely-shaded highway adds greatly to the market value of the farm along which it passes. A man of taste dislikes to see a mudhole in front of a farm house, the gate hanging on one hinge, or none, the fences along the road in a sadly dilapidated condition, or the front yard grown up to noxious weeds, but above all he dislikes an impassible road.

The inefficiency of the ordinary method of improving highways has been everywhere observed. In many places good roads cannot be maintained without a large expenditure of money—more than the farmers who live along its line are able or willing to furnish; consequently the government, from time immemorial, has been in the habit of granting certain franchises to companies and corporations on condition that they build and keep in good order and repair certain roads. The company or corporation is authorized to enter upon, take, and use any public highway, and to construct thereon a plank or gravel road, provided the consent of the supervisor, highway commissioners, and township clerk, or a majority of them, be obtained in each town through which the road passes; or, instead thereof, the consent of a majority of the freeholders residing on that part of the highway so to be taken. It is presumed this consent will never be obtained unless the road needs much more improvement than the ordinary methods will give it. The company thus authorized are obliged to build the plank or gravel road in a good and substantial manner, and become responsible for all damage that any party may sustain in consequence of any neglect or omission to keep the road in good condition or repair, and are also liable to lose their franchise.

Thus, when a woman received personal injuries occasioned by her horse jumping aside at sight of a hole three feet deep near the middle of a gravel road, although there was plenty of room to pass on either side in safety, she was allowed to recover damages of the company. So, when the road was out of repair so that it caused two carriages to collide, whereby an injury was sustained, the company was held liable. They are also liable for not maintaining railings along embankments, whereby one without fault is injured, as by running off in the night. So they are required to keep their bridges in a safe

condition, unless some unavoidable accident or calamity, like a flood, happens. They are liable for injuries occasioned by defective bridges—and when a bridge is carried away by a sudden flood the company must rebuild it within a reasonable time. The company is, however, not liable for an accident to one who overloads the bridge, if it be of sufficient ordinary strength. When a toll-gate keeper violated the custom of the road by shutting up the gate at an unusual hour, and placed a bar not easily observable at night, whereby a traveler's horse was killed, it was held that the company was liable for the value of the horse.

Though a company has a right to repair its road so as to prevent the effects of rains and freshets, yet in the exercise of this right, it must take care not to injure the owners of adjoining land. It has no right to turn water which washes the road on to the land of a private person; and if damage accrues to the owner of adjoining land in consequence of the want of care in this respect he may recover.

The company may close its gates against a traveler liable to pay toll who attempts to pass without payment; and if such traveler forcibly saws or breaks open the gate and passes through he is guilty of a malicious trespass, as well as liable to a penalty, under the statute.

In 1853, a traveler on the Howell plank road, from Detroit west, at the first gate, three-fourths of a mile, tendered the gate keeper the toll for one mile, and claimed a right to pass the gate. The keeper inquired how far he intended to travel on the road. He refused to tell, and insisted on his right to pass on payment for one mile, being all that he had then traveled. Thereupon the keeper demanded toll of him to the next gate, and ordered him not to pass the gate until he paid it. But the man refused to pay any more, and passed the gate against the express order of the gate keeper, the gate being open, and the keeper offering no personal resistance. This matter having been brought before the Supreme Court, that court held that the gate-keeper had a right to demand toll of this traveler at the gate in advance of his actually traveling upon the road, and, on his refusing to state how far he was going to travel upon the road, had a right to demand toll to the next gate, and that party passing the gate thus against the order of the keeper, without paying the toll demanded, was guilty of forcibly and illegally passing the gate, and liable to the penalty therefor.

The law provides that every person subject to toll who shall travel on any such road between the toll gates, and shall not pass through any gate, shall be liable to pay, on demand, the regular toll at the rate per mile for the distance actually traveled. Accordingly, when a man lived on a plank road one mile from a store, and in going to and from the store he traveled on the road, but did not pass any gate, it was held that he must pay toll for the distance traveled. The statute also provides that every person who, to avoid the payment of toll, shall turn off from the road, or pass any gate on any ground adjacent thereto and enter again on such road, shall forfeit and pay the penalty of \$10. The question in such cases is, whether one turns off in good faith or with a view to avoid paying toll. When a person with a drove of cattle turned off about a half mile from the gate, and traveled around some six or seven miles and entered upon the road again about three and a half miles from the gate, it was held to be turning off on land adjacent to the gate within the meaning of the law, and having done so with intent to avoid paying toll, he was held liable.

There are certain persons exempt from the payment of toll, such as persons

going to and returning from military parades which, by law, they are required to attend, and persons going to and returning from funerals; also farmers and their employes, engaged in the business of the farm, in passing from one part of the farm to another with teams and stock. It would not be a proper thing to do for a farmer, under the pretense of going to or from a funeral, to take a load of produce to market or go on some other expedition. In such case he would be liable for toll, although he might be in a funeral procession; and if he were to make any false representations to induce the toll-keeper to let him pass without payment, he would be liable to a penalty.

Suppose a farmer has two farms several miles apart; can he travel from one to the other on a gravel road without paying toll? I think not.

LECTURE NUMBER FIFTEEN.

THE FARMER AND HIS HIRED MAN.

I have spoken of this matter on a former occasion, but shall do so now more at length. There are certain relations which exist between the farmer and his hired man which it is important to know. The relation is created by contract, express or implied, usually by hiring. A general hiring, without any limitation as to time, was construed by the common law as a hiring for a year. The rule of the common law is modified by contract, by custom, by date and frequency of payments, and by other circumstances. If you employ a man for so much a month, a week, or day, without any time being specified it is ordinarily understood as an employment from month to month, week to week, or day to day, as the case may be.

The relation may be created by implication, without any express hiring, as where a man volunteers to perform work for you. You see and know that he is performing work for you, and make no objection. But there must be knowledge and recognition on your part in order to bind you. One can not, simply by volunteering a service, compel you to pay for it. If you see a man performing services for you day after day, and make no objection, although no contract or hiring is made, you will be expected to pay him what his services are reasonably worth. A contract for services which are not to be performed within a year is void, under the statute of frauds, unless in writing.

If no definite period of employment is specified, the hired man may quit when he pleases, or be discharged at any time. The employment ceases when the time expires, unless renewed by an express or implied agreement.

You may discharge your hired man for willful disobedience to your orders; as when one was ordered to go on an errand just as dinner was ready, and refused to go without his dinner; also, where a harvest hand refused to work without beer or whisky. You are also justified in discharging him for moral misconduct, as for embezzlement, robbery, habitual drunkenness, fraudulent conduct, betraying confidence, and the like. He may also be discharged for wanton negligence, or palpable inefficiency, amounting to a breach of the implied promise that he was competent to do what he was hired to do.

If you discharge him before his time expires, without cause, he may treat the contract as continuing, and sue you for the breach; or he may treat the bargain as rescinded, and recover for the services rendered. You hire a man

for a year and turn him off at the end of a month without cause—he may hold you responsible for his wages for the whole year; but you can offset whatever you can show that he might have earned by other similar employment in the same neighborhood, that is, if he can get employment. He must not unnecessarily lie idle, but it is for you to show that he might have got employment.

If your hired man voluntarily leaves you before his time expires, he is liable to you for damages; but if he is prevented from fulfilling his engagement by sickness, or some other unavoidable accident, he is entitled to a reasonable compensation for the services rendered. But you are not obliged to take him back after he recovers. If he is carried to prison for a crime of which he is found guilty, or for a debt unpaid, the contract is considered broken by his own voluntary act, and he is liable accordingly. But if, on the other hand, he is carried to prison on suspicion of being guilty of a crime, of which he is ultimately acquitted, he is not liable to you in damages, because there was no voluntary breach of the contract on his part.

You cannot compel your hired man to make up lost time after the expiration of the period of service. You have a right of action against one who knowingly and willfully entices him away, or injures him, causing you the loss of his services.

In relation to the torts and negligence of the hired man, the rule is that the farmer is responsible in damages to third persons for such acts, occasioning an injury, whether the act is of omission or commission, in conformity to, or in disobedience of orders, by negligence, fraud, deceit, or even willful misconduct, so long as it was in the course of the employment. To illustrate: Suppose you have a horse afflicted with the glanders, or the “heaves,” which you wish to get rid of, and you direct your hired man to take him out on the road and trade him off, or sell him. You give express directions to the man not to warrant or recommend him, or to use any of the deceitful tricks of the horse-jockey. He starts out, and “stumps” the first man he meets for a trade. The man asks him if the horse is sound, and he replies, with all the brazen impudence of an experienced jockey, that the horse is perfectly sound, not a blemish or fault about him, and that he would not be afraid to warrant him, whereby he makes a “slashing” trade, perhaps cheats the man out of a valuable horse. Who is liable for the cheat? You are, because the cheat was in the course of his employment. If the cheated man had known what you had said to your hired man it might have been otherwise.

A hired man, in driving a cow out of his employer's cornfield, struck her with a stone, which killed her. Held, that the employer was liable for the value of the cow.

A farmer put a bag containing barley into his wagon under his shed. In two or three days thereafter his hired man took the bag from the wagon, supposing it to contain oats, and carried it to a place where he was drawing logs for the farmer, to feed the horses with its contents. Finding his mistake, he fed some of the barley, and then put an iron bolt that he had been using as a clevis pin into the bag, and carried the bag home and put it into the wagon where he found it, without informing the employer of what he had done. Soon after the farmer, not knowing what his hired man had done, nor that the bolt was there, filled the bag with ears of corn and carried it to mill to be ground, and in grinding the bolt got into the corn-cracker and injured it. Held, that the farmer was liable for the carelessness of the hired man.

In a case where the hired man used the farmer's horse and carriage in going

upon an errand for the farmer, and, instead of taking it to the stable, used it in going upon an errand of his own, without the farmer's knowledge or consent, and while doing so, negligently ran into and injured another's horse, it was decided that the farmer was not liable.

A farmer is liable for trespass of his hired man, done honestly in the course of his employment—as cutting timber on land of an adjoining proprietor.

The liability of the farmer proceeds upon the ground that an act is done in the course of the employment. If the farmer himself would not be liable had he done the injury, he is not liable if done by his hired man. And if the third person so injured knows that your hired man is acting contrary to his employment, he is without remedy.

The farmer is not liable for a wrongful, willful, and unlawful act of his hired man toward a third person, although he professes to be acting within his employment, if the act be entirely independent, and outside of, and having no proper connection with the employment. As, if he should make a wanton and unprovoked assault, or wantonly drive the farmer's wagon against another. So, when, through the negligence of one's driver, the carriage wheels became entangled with those of another party, and the driver struck the other's horses with his whip, and they suddenly started and overturned the other carriage, the employer of such hired man was not liable.

One more illustration: Suppose it to be the duty of your hired man to unload a certain load of wood, by throwing the wood overboard, and in so doing he accidentally or purposely hits and wounds a bystander—you are liable. But if this unloading was no part of his duty at the time, and he should purposely throw a stick at and injure a bystander, you would not be liable. The test of the responsibility is not whether the act was done according to instructions, but whether it was done in the prosecution of the business that the hired man was employed to do. And if the hired man, in doing a particular act in a particular manner, departs from the appointed mode of performance to inflict a wanton injury on a third person, the employer will not be liable.

LECTURE NUMBER SIXTEEN.

SALE OF FARM PRODUCTS.

A sale is a contract between parties to pass rights of property for money which the buyer pays, or promises to pay, to the seller for the thing bought and sold, and is to be controlled by the intention of the parties. If I say to you, "I will sell you my horse for fifty dollars," and you say you will give it, the bargain is struck, and if I tender you the horse you must pay me the price. If you immediately tender me the fifty dollars the horse is yours, but if neither the money be paid nor the horse delivered it is no sale, and I may dispose of the horse as I please. As soon as the bargain is struck the property in the article sold is transferred to the buyer, and that of the price to the seller, but the buyer cannot take the article away until he pays or tenders the price agreed upon; yet if he tenders the money to the seller, and he refuses it, the buyer may seize the article or have an action against the seller for

detaining it. And by a regular sale, even without delivery, the property is so absolutely vested in the buyer that if it afterward dies or is destroyed in the seller's custody, without his fault, still he is entitled to the price.

We call a commutation of one article for another, as of one horse for another, a trade or an exchange, but with regard to the law of sales or exchanges, there is no difference. If I say "I will give you my horse for yours," the bargain is struck if you agree to take it, and if immediate tender be made it has the same effect as a sale for money.

If two parties exchange horses with the privilege to one of the parties to return within a given time the horse received by him in exchange, and such party fail within the time to return the horse so received, the trade becomes absolute.

Where one party says to another: "When you get ready to sell your corn haul it to my warehouse in Grand Rapids, and I will make it satisfactory as to price," and the corn is hauled and delivered at the warehouse, the law implies a contract to pay the market price at the time and place of delivery.

When there is a mutual mistake as to price, as, for instance, when the seller asked \$165, but the buyer understood him to say \$65, it is no sale, and, although the article be delivered, no title passes.

Farm and dairy products thereafter to arise out of the farm are the subjects of sale—as, if I agree with you to pay you a certain price for your wheat when it is cut and threshed, or a certain price for your wool when it is sheared, or the market price for your pork when it is fattened. If I pay you the price, or you give me credit, the product is mine when the time arrives.

A sale of a certain description of standing timber, to be taken off in a specified time, is a sale of so much as the buyer takes off within the time specified.

If a person having a crop on another person's land sells all his interest in it, this is a complete sale, and passes all the property which the seller has in the crop to the buyer.

A contract provided for the sale of "all the hemlock bark now on the trees standing" on certain premises. The purchaser agreed to have all the bark "peeled by the first day of September, 1864, piled, measured, and settled for in full," and he was to "have the right and liberty and privilege of free ingress and egress, to enter at any time and at all times upon said land, to cut, fell, and pile the bark, and to draw it away." It was held that the purchaser was not entitled to any bark except such as was peeled and piled before the time specified.

A bought a lot of potatoes of B, and B agreed to put them in sacks and ship them to A's residence. It was held that B was bound to deliver them on board the cars to be transported to A's residence.

A contract between a farmer engaged in raising corn and a grain dealer, made whilst the corn was growing in the field, whereby the farmer sold to the dealer a certain quantity of corn at an agreed price, to be delivered when called for, the purchaser to give ten days' notice of the time he would call for it, and a part of the purchase money being paid at the time of making the bargain, is an absolute sale of the corn, to be delivered in the future; and in such a case the purchaser is bound to give notice of his readiness to receive the corn within a reasonable time, and if he fail to do so the seller may offer to deliver the corn without such notice, and the purchaser is bound to accept and pay the contract price.

By statute, no contract for the sale of any goods, wares, or merchandise for the price of fifty dollars or more, is valid unless the purchaser shall accept

and receive part of the goods sold, or shall give something in earnest to bind the bargain or in part payment, or unless some note or memorandum in writing of the bargain be made and signed by the party to be bound thereby, or by some person by him lawfully authorized.

This statute applies to farm products, stock, and all personal property which the farmer has to sell. The delivery required by this statute may be either actual or constructive and inferred from circumstances, as when a man bought a span of horses, but requested the seller to keep them in his stable, and took no other delivery, and they were taken by the seller to his stable and left remaining there. It was decided by the court that the property passed to the buyer, and became his property, and was duly delivered within the meaning of this statute, and that the seller could recover the price without any further delivery or memorandum in writing. It was so held upon the ground that taking charge of the horses under the agreement to keep them was a constructive delivery within the meaning of the statute. What is a delivery depends upon circumstances. When logs are bought on the ground no actual possession need be taken; the pointing out of the logs will amount to a delivery sufficient to satisfy the statute. So with any other like ponderous articles. There are many branches to this subject, which I shall take occasion to notice as I proceed.

THE BREEDING AND CARE OF SHORTHORNS.

AN ADDRESS DELIVERED BY HON. WM. BALL BEFORE THE MACOMB
COUNTY SHORTHORN BREEDERS' ASSOCIATION.

MR. PRESIDENT, AND GENTLEMEN,—The subject assigned me, namely, “Breeding and Care of Shorthorns,” embraces so much, and at the same time requires so much practical and theoretical knowledge in order to be treated in a manner that shall be of interest and instructive to the listener, as well as a credit to the writer, that I almost shrink from attempting to deal with a matter upon which so many differences of opinions prevail, with any degree of confidence. A great deal has been written upon this subject (much of it theoretical), and very much has been said also; but writers and talkers in this, as on most matters, differ so greatly that one is confused and bewildered oftentimes, rather than enlightened or benefited. There are several classes of theorists, each claiming prominence for their methods of breeding, each trying to prove to the world that their practices and theories are the true ones and should be followed if sure success would be secured.

The theory of in-and-in breeding has many followers. The same may be said of type or line breeding. Others advocate the selection of animals of different families of the same breed of cattle when seeming to be well mated for copulation. Good results have undoubtedly followed all these different methods of practice, and also bad results have followed. To know how to combine the best blood of the best animals in a manner that shall produce the best results, to know how to make selection of good animals that shall nick well with each other, should be the careful study of every breeder of Shorthorns. Some grand results were achieved in the days of the Collings, Masons, Booths, and Bates, by concentrating the blood of the cattle of that period by what is called incestuous or in-breeding, and by many those results are brought as an argument for still continuing the practice. It does not follow, however, that because good or even extra cattle in those days were produced by in-breeding that the practice is good for the breeders of to-day. Take, for instance, the herds of cows of Charles and Robert Colling. These brothers both followed the system of in-breeding from about 1780 until the close of their breeding career in 1810 and 1818. It is said that about the time that Charles Colling commenced his course of successful in-breeding he had as a basis of his herd Lady Maynard, Young Strawberry, and other cows selected in his neighborhood, differing widely in their breeding. To prove this I quote from “Allen’s history of Shorthorns:” “Let it be borne in

mind that while the Collings were thus vigorously busy in working up their herds, the older breeders around them had not been idle. The selections of the Collings were made from among the cattle of these breeders, and it may well be supposed that they still retained in their hands animals probably equal in quality to any with which they parted; but wanting the dash of the latter established Barmpton and Kelton breeders, they failed to bring their own herds into equally prominent notice."

The herds of the county above alluded to were represented as very valuable herds, of great individuality, but were bred without any reference to in-breeding; on the contrary, had been bred adversely to that system. The success, then, of the Collings in their in-breeding was due, in my opinion, to using their incestuously bred bulls on cows of very different breeding than themselves. The conclusion drawn from the course of the Collings is that, while they with their sagacity and good knowledge of their business, and with the early bred cows without anything particularly in common so far as blood was concerned, good results might reasonably be expected, but that such a course closely followed by breeders of to-day, with so many generations of blood of similar origin in the cattle, would be at least a subject of doubt. Even in that day the practice of the Booths was to secure bulls of the Collings, which had a large concentration of blood, and use them on their cows of different strains of blood and characteristics, and again purchasing of the same or other parties bulls for use.

The practices of the Collings were followed by Thomas Bates, who had made a purchase or two of Charles Colling from the offspring of the Duchess of Stanwick cow, using bulls of similar breeding. It is a historical fact that from the two or more females purchased of the Duchess family, only 31 of their female descendants were recorded in the English Herd Book for a period of twenty-two years. And here Mr. Bates halted and introduced the blood of the Princess family, though somewhat similar through their earlier ancestry, and this practice was occasionally followed afterward, as by the introduction of the Matchem cow, etc. The conclusions to be drawn from this method of in-breeding are that while it may prove valuable in the hands of skillful breeders as a means of establishing prepotency or strong concentration of blood, still it is an undoubted fact that sterility is almost sure to follow; that delicacy of constitution is incident to such a course. That while in some cases grand results may and have been reached, more that are damaging have to be chronicled. Had the Stanwick Duchess of Mr. Colling, whose descendants Mr. Bates so long bred, been as prolific as the well bred (but not in-bred) Young Mary, by Jupiter, instead of the number of Duchesses being confined to the pitiable few now known, they would be numbered by thousands upon thousands. Scrofula, consumption, and their attendant diseases are frequently the result of this method of breeding.

That the in-bred Duchesses, Kirklevingtons, and many other families (which have in the past brought fabulous prices) are now fast declining in prices is a proof that breeders are coming to look at the matter in a more practical way, and that unless there is much more substantial value in them than has been seen of late they will still further decline; and this in the face of the fact that they are not multiplying in any degree commensurate with other well bred cattle. In connection with this in-bred or high bred class of cattle, as they are synonymously called by many, and pertaining particularly to values, I quote from Prof. J. P. Sheldon on Shorthorns in England. He says: "It is beginning to be suspected that the days of extremely inflated

and artificial values for pedigree Shorthorns are numbered. This may or may not turn out to be a prophetic suspicion; but in any case, there are nowadays strange fluctuations in prices of the finest tribes, which seem to point in the direction of permanently lower ones in the future. This again may or may not turn out to have been a leading or misleading omen, yet there can be no doubt that our more fashionable tribes and herds have been worked up to a degree of fiscal prominence which, to say the least, has not been an unmixed benefit to the bovine interests of the world. It is a sort of open secret that Shorthorn interests in this country are of so sensitive and delicate a character and have so many 'wheels within wheels' in the machinery which keeps them running along, are bolstered up by so many artificial props, and sustained in such an intricate network of fancies and devices, that the defection of half a dozen of the leading men would bring about a collapse in which would be involved the ruin of a good many people where all and more than all is invested in the matter. I am not one of those who deplore entirely this state of things, though I consider the intrinsic value of the Shorthorns has been left altogether too far behind, and that it has been a mistake to admit so much of the speculative and gambling element into Shorthorn transactions. It was perhaps inevitable that the business should become artificially inflated so soon as a number of wealthy men took a fancy for it; but at the same time we must admit that it has been much more extensively developed, and been made more attractive, and perhaps more generally successful than would have been the case without these men. One thing we must remember, viz: That these men would not themselves have taken much especial interest in it were it not that a large capital was involved. Certain it is, also, that the science of animal reproduction cannot be pursued to any great length without the aid of plenty of money. It is, moreover, true that as the wealth of a country increases, as that of England and America is increasing, men will take in hand various fancies, or 'hobbies' as some folks call them, will devote limited time and almost unlimited money to them, and so run up the business that it entirely loses its intrinsic value in one that is governed only by fashion and the length of men's purses."

We are led to quote these remarks from Professor Sheldon as pertinent to the subject of fancy breeding, and the determination of certain breeders to make some lines of fancy breeding aristocratic and fashionable at the expense of more substantial and practical value, though not bred according to certain breeders' fancy. What breeders of Michigan should strive for is to breed those families in good repute for their good qualities as well as good pedigrees to the greatest perfection possible. In order to do this it is not necessary that on account of the name of an Alexander, a Cochrane, or an Earl Ducie, a breeder with moderate means should impoverish himself to obtain one of their fancy pedigreed bulls, which, in many instances, breed no better, nor as well as bulls reared by more modest breeders. Shorthorn breeding, like all other branches of business, should be conducted on a good, substantial basis, and the business should sustain itself and yield a profit to the breeder, or else he should abandon it. The question is, how shall this be done? I answer: First, get good bred animals at a moderate price, so that after a cow has bred two or three calves it costs no more to raise a thoroughbred than a grade. The increased value of a thoroughbred, as compared with a grade, will prove remunerative even though they be raised for beef. This however, is not, nor will be necessary for years or ages to come. Until the countries are better supplied with good cattle than at present, there will be no glut in

the market for breeding purposes. As land increases in value, as the demand for more and better meats increases, more improved cattle will be demanded; from this fact, that farmers cannot afford to raise inferior stock, and the low prices for wheat and many other kinds of grain, will force the farmer to raise better stock in our own State, and the demand must be good for all time to come. This much is true, and when is added the vast demands of the west and southwest, the prospect is still further guaranteed. To make improvement, and to increase the permanent value in his herd should be the aim of every breeder.

This cannot be done at random. The mere act of coupling animals of different sexes is not breeding in its full sense. If you were to make a draft of a house which you would build, you would be expected to know, before you ever struck a blow with the mason's hammer, or drove a nail, or cut a stick of timber, for said house, just how it would look when completed; also how far from the road it should be located, on what site it should be placed, how it should be painted to bring out the most beauty, how the interior should be constructed to be of the most practical value and beauty. All this you would be expected to know before you would be considered a finished builder or architect. Every inventor should have his model, and in constructing the design the model should never be lost sight of. He must, if he succeed, produce in substance the model of his imagination. If you would paint a picture you must have your model to work towards. Some paint from imaginary, some from real models, but some model is necessary to produce what is desired. So in breeding Shorthorns, every successful breeder must have his model. He must have in his mind the form of the animal he wishes to produce, and then his effort should be to produce it. And here comes the difficulty. He is to breed the cows of which he may be possessed. In this case he must depend upon the bull he uses for improvement. What sort of a bull does he need? There are plenty of well bred bulls within his reach. The difficulty lies in selection, and this has always been one of the troubles towards success. A great deal of care, observation, and study are required in this selection, for frequently bulls looking alike, and bred alike, breed with very different results, and it is, in a great degree, experimental, though not entirely so. A breeder, in my opinion, should study well the breeding of his herd; should know, if possible, their antecedents. He should find out how much blood of the cow from which they take their family name there is in the cows he proposes to breed. He should study as much as possible how well the different strains of blood in his cows have blended, also whether similar strains have been used or whether they have been bred promiscuously. He should also qualify himself with the facts regarding the results of mingling the blood of certain families, and in selecting a bull he should be sure and get one which would be likely to sympathize with the blood of the cows which are to be bred to him. Then if the individuality of the bull is such as he wants, and bulls of such family have mixed well with similarly bred cows, then he will do to experiment with.

The bull should be as near as possible to the model he would imitate. In my judgment the model for a Shorthorn should approach a perfect butcher's animal, for the final end of Shorthorns should be beef. This last remark is made with a belief that what would be admitted as essential qualities in a model Shorthorn, would also be desirable qualities in a butcher's animal. The description of the animals which were awarded the prizes at the fat stock shows recently held at Kansas City and Chicago answered well the qualities of a model

Shorthorn, as will be found in the included description, which is as follows: Fine muzzle, with a wide open nostril; a fair sized mouth, with thin lips and light, fine under jaw devoid of flesh; color of the nose yellow or orange; the head should be well proportioned, of proper length and breadth, fine for the cow and stronger in the bull, cheeks lean, forehead broad, narrowing along the face towards the muzzle; the eye should be prominent and large, with a mild, gentle expression; the horn should be light, with an inclination to curve inward and downward, of a waxy character, with or without black tips; ear should be upright and thin, and covered on the outside at least with a good coat of long silky hair, and flexible in movement; the neck should be strong at the base and well set, tapering towards the head, where it should be of an oval shape, running backward on a level in a cow, deepening and widening as it approaches the bosom, where it should connect in a smooth expansion, so that it can hardly be seen where the neck terminates or the bosom begins. The neck should be free from hanging skin. The chest should be deep, broad, and full, indicating robustness and good constitution. The brisket should be set prominently forward, perpendicular in front, broad and well let down, with a thin, pendulous skin underneath, indicating an elasticity of the flesh enclosed within it. Shoulders should be broad and even at tops, smooth and well covered at the points, and sloping and tapering symmetrically into the fore legs above the knees. The knees should be round, muscular, and stand well apart, the legs below fine boned and terminating in hoofs of proper size. The cups or spaces behind the shoulders should be full and smooth. Ribs should be well sprung, long, and deep, giving abundant space for well sized heart and lungs to play, and develop what some may call fore flank. The back should be on a level from the chine to the setting of the tail. The loin should be broad and full, and level with the hips, which should be wide, smooth, and level with the spine. The rumps long, full, broad, and level, narrowing from hips to pin bones or points of the rumps, which latter should be wide apart. The tail well and strongly connected with the spine on a straight line, small and tapering to the brush, which should be full of long hair. The flank should be full and low, on a line with the belly and thighs. The hind legs should be straight, standing well apart, with a strong, muscular hock, tapering into a fine-boned flat leg below, ending in a well shaped hoof. The twist or space above the junction of the thighs should be broad, full, and covered with soft, silky hair. The hair should be close, long, and soft. The touch should be elastic, mellow, and springy under pressure of the fingers. The skin should be moderately thick, strong, and loose, moving easily with the action of the hand upon it, showing plenty of cellular tissue underneath.

The above description is condensed from Allen's description of a perfect Shorthorn, and is generally conceded to be correct; and in breeding for beauty and perfection these different qualities cannot be overlooked. The successful breeder must be a close student by observation and comparison. He should study physiological development, and understand well the processes by which nature produces the best specimens of the animal kingdom. He should know the laws which govern heredity. He should know what are defects, and know how to breed them out. The aim should be to produce an animal which shall, so far as blood or pedigree are concerned, be of the best, and at the same time combine the greatest number of good qualities which go to make the most perfect Shorthorn.

The subject is inexhaustible, and can only be just alluded to in a paper for an occasion like this. The other part of the topic assigned me, "Care of

Shorthorns," is one which materially affects the growth, development, and perfection of this noble race of cattle. It has been said that "the breed was in the pail," and while this is not literally true, still feeding and care have much to do with the development and growth of most domestic animals. One of the objects of the early breeders of Shorthorns was to produce an animal which should make the best and most perfect specimen when brought to the butcher's block. Witness the breeding, feeding, and traveling of the white heifer of the Collings; also the white ox, both fitted for traveling to advertise the beef qualities of the Shorthorns of that day. From our earliest history of the breeding of this class of cattle one of the main objects has been to make this *par excellence* a beef animal. It is also true that early maturity, a capability of assimilating food, with reference to fat, has been among the improvements sought. By feed and a judicious selection of stock to breed from, Bakewell produced from the common sheep of the country a breed of sheep unsurpassed for fattening qualities and early maturity. And more recently the improvements made in hog raising are due in a large degree to the liberal and scientific manner of feeding. Of course selection was the companion in improvement. And it is equally true that these improved breeds of stock deteriorate in quality and quantity when placed in the hands of careless breeders and poor feeders. By good feeding we do not mean a wasteful and extravagant manner of feeding, but that system calculated to make the greatest profit to the owner, as well as the proper growth of the animal. If what has been said be true, and no well informed man will deny it, then one of the first things to be considered is the proper amount and kinds of food to be used. In this State, where our winters are usually long and severe, a long time ensues in which our stock has to be fed. My own opinion is that various kinds of coarse fodder should be used, feeding first one and then another, corn stalks, marsh hay, straw or tame hay if plenty, with grain enough to keep the animal in a good growthy condition and moderately fat. The kind of grain used should depend on the age of the animal. For calves I have found corn and oats ground together in equal parts and mixed with an equal amount of wheat bran by bulk to be feed upon which the young things would thrive well, the oats and bran making muscle and bone, and the corn adding more particularly flesh. The amount fed to depend on the condition of the animal. For older animals the mixture is also good, with more meal and less bran. For fattening purposes the bran acts as a helper in digesting the meal, and cattle which are suckling calves need no better feed. This is not particularly a root country, and I think that perhaps ensilage may in a degree help supply the lack if any for the loss of the roots. It is poor policy to let an animal get thin in winter for want of grain. When spring comes and cattle are turned to pasture they should be in good condition. They grow faster, thrive better, and breed better, and are better. When you wish to sell them they bring more money, sell more freely, and create a better impression of your herd to any visitor who may see them, besides affording a satisfaction to their owners. It is also true economy. If you have an animal that a moderate amount of grain in winter and a good pasture in summer will not keep in a good condition, unless it be some cow giving a large amount of milk, sell it. Better keep two animals well than three poorly.

My own experience and my observation havetaught me that many farmers keep too much stock for their farms. When I began to raise cattle I thought I could keep two or three head of cattle upon an acre of pasture, and so I could for a month or two while the pastures were in their most growthy

state, but after that season had passed and the summer drouths had put in an appearance the feed became dry and was soon gone, and I found that I had not calculated right. Instead of trying to keep two or three head of cattle on an acre, I try to have two or three acres of pasture to one head of stock, and I find this the preferable way. When it becomes dry and pastures grow little, cattle will thrive well on what grew when there was plenty of moisture, although what was left might be dry. With many there is a feeling that pastures should be eaten down to be profitable. This is a mistake. All will be eaten in the course of the season. Feed liberally and it will pay. Feed poorly, and you will be the loser in more ways than one. Next to liberal feeding should come warm, comfortable stables, properly made and cleanly kept, with plenty of good bedding for cattle to lie upon. Much food is wasted by insufficient and cold stables. The comfort of stock should be one of the first cares of the breeder. Not every man is fit to care for cattle or other domestic animals. A herdsman should be possessed of good common-sense, be faithful, kind hearted, and patient, and should have time in which to do his work well. I think cattle should receive a slight carding every day through the winter. The cattle like it, it does them good and makes them gentle. There are differences of opinion in regard to calves running in the lots with the cows. My practice has been to allow the calves to run in the yards with their dams in winter and in the lots in the summer, and with good success. It saves very much labor in summer, especially if the fields are a good distance from the barns. I have followed this plan for years, and shall continue to do so in the future unless circumstances change my mind. With good feed, good care, and comfortable stables, good water is also a necessity. The purer the water the better the cattle will do. I have no regular time to breed cows, allowing them as a rule to bring as many calves as they are disposed to. As no great achievement was ever made and never ought to be made without study and work, so no man ever bred and improved a herd of Shorthorns without study, thought, and practice. And as a rule the more a man thinks, the more he reads, the more he practices intelligently, the surer he will be of success. A drone in any branch of business is, and ought to be, a failure. The laws which underlie the breeding of Shorthorns are equally true of all breeds of animals of a domestic nature, though differing in the purposes for which they are bred.

In conclusion, let me say that if we succeed we must be up and doing. Life is short at best and should be well improved. The class of cattle that claim our attention should be of good, substantial families or breeding. Our model should ever be seen before us, and each generation of our stock should more nearly approach our standard. Merit should be sought after. This fashion or that fashion should receive at least a secondary consideration. Good pedigrees together with individual excellence should not be lost sight of. With these objects in view and a close application to business we shall succeed.

Thanking you, Mr. President, for your kind invitation to be with you and to participate in your deliberations, and sorry that time and ability have prevented me from giving the subject assigned me what its importance demanded, I will close by also thanking the association for their kindness and attention.

THE FUTURE OF BUTTER-MAKING.

PAPER READ BY MRS. G. M. SHATTUCK, OF PONTIAC, AT THE ANNUAL MEETING OF THE MICHIGAN DUTCH-FRIESIAN (HOLSTEIN) BREEDERS AT LANSING.

MR. PRESIDENT, LADIES AND GENTLEMAN: It has been said to me that no man can succeed in raising and dealing in thoroughbred stock, unless his wife is interested also, and assists him by her wisdom and counsel. I came here to-day to say to you gentlemen of this Association—that farmers' wives, as a class, are very much interested in fine cattle for three distinct reasons: First, a woman can not be loyal to her husband's advancement and success in any legitimate business, and not interest herself in it to a certain extent. Second, women can and do appreciate the good, the useful, and the beautiful in the animal kingdom, as well as in fruits, flowers, and the waving grain. I really think the ladies are becoming more and more interested in the new species of cattle called Holsteins and Dutch Friesians, for who can look upon these meek eyes, clean, positive-colored, symmetrically-framed cattle, and not feel pleased? Thirdly, women are interested in the work and the money which their products bring, and money is as essential to a woman's happiness as the sunlight and the fresh air she breathes.

There has of late been a great inquiry for the "coming cow." The one for every, or special purposes. It seems to me the inquiry has found an answer among the Holstein. She meets the demand every time. If a man wishes a great quantity of milk for cheese, or to sell in town for use in families, this species of cow gives barrels of the lacteal fluid to supply the demand. If he wishes to make butter, this cow will meet the requirements, in quantity, quality, and flavor. And after yielding enormous quantities of milk, the carcass affords a large amount of beef of extra quality, unlike the so-called Shorthorn, who appropriates the extra amount of feed to the making herself round, fat, and plump. Our experience has been so far that a Holstein cow will give the quickest return for the amount of feed given. Increase the feed and the next twenty-four hours will reproduce it in an extra supply of milk. But setting aside this skirmishing. I will come down to real facts. Let me give you a few statistics taken from the Agricultural World:

"The importance of the dairying interest may be somewhat appreciated when it is remembered that two hundred millions, three hundred and fifty thousand dollars are invested in this branch of industry. This amount is

nearly, if not quite, double the money invested in banking and commercial pursuits. It requires fifteen million cows to supply the demand for milk and its products in the United States. To feed these cows, sixty millions of acres of land are under cultivation. The agricultural and dairying implements are worth two hundred million dollars. The men employed number seven hundred thousand, and the horses one million. These horses and cows consume annually thirty million tons of hay, ninety million bushels of corn meal, the same of oat meal, two hundred and seventy-five million bushels of oats, ten million bushels of bran, and thirty million bushels of corn, to say nothing of the brewery grains and other questionable feed given. It costs four hundred million dollars to feed these cows and horses. The average price paid to the laborer for wages is twenty dollars per month, amounting to one hundred and sixty-eight millions of dollars annually. The average cow yields about four hundred and fifty gallons of milk a year, giving a total of sixty billions seven hundred and fifty million gallons of milk a year."

Now, what is to be done with all this enormous quantity of milk?

Quite a fair proportion of it is made into cheese, and a very large proportion of it is sold in towns and cities by the quart and pint for family use. But by far the largest proportion is made into butter, for butter is a staple article of food and commerce. Bread is considered the staff of life, and may not the same term be applied to butter, for whether the family be rich or poor it enters largely into the make-up of every meal, while the article is good, bad, or indifferent in quality and large or small in quantity. In Michigan, very much of the butter is made by the women of the farm. In the foregoing statistics the term men is applied to those employed in the dairying interest. It is true in large establishments, but there is so much of the dairy business done on a small scale that it is expected the wives and daughters of the household will manage the butter-making. Of course, the men do the milking, feeding, and caring for the cows, but the pails of milk are turned over to the care of the women. Farmers keep from one to twenty cows, and the milk is expected to be made into butter, mostly. Some of these households have modern conveniences, good cellars, plenty of ice, and, by far the greatest requisite, a sort of "cast-iron constitution." But very many housekeepers have none of these helpers, and yet they are expected to compete with the first-class butter-makers of the land. A person cannot offer a greater insult to some of the farmers' wives than to insinuate they do not make good butter. Yet the amount of poor butter on the market is tons, and the number of poor butter-makers are legion.

It is said the "American people are a nation of grumblers;" and in regard to the butter question they are. We hear inquiries and complaints on every hand. Shall we eat much butter? What shall we do with our butter? How shall we market it, and how shall we sell it? If we agitate the question that butter ought to be graded the same as any other commodity, as wheat or corn, the ordinary groceryman begs leave to demur against any such procedure. He wants to retain the custom of the one who makes poor butter as well as the one who makes an article of extra quality, and hence he mixes all together, that the good may sell the poor. A few rich, fastidious people, who desire to use only the best the market affords, are willing to pay a fair, remunerative price for excellent butter; but there is a large class who complain of the price, and still a larger class who complain of the quality. The making of butter in the past has been an up-hill business; not much encouragement held out to those who desire to make an excellent article, only a clear conscience and a

determination to do right. At present prices farmers do not get pay for the milk, to say nothing of all the hard work and money invested.

But this is an age of progression, and it has reached the dairying interest. Men are on the lookout for the most profitable cows for this branch of industry, and inquiring the quickest and easiest method of getting returns for the money invested. I have already discussed the question of the kind of cow (Holstein), from which to get the quickest returns. Now what are we to do with the great amount of milk they yield? In some localities farmers have combined and erected cheese factories, and a good quality of cheese is made which brings a fairly remunerative price. But because people do not sufficiently appreciate the value of cheese as an every day article of diet, the market is soon overstocked. Others living near town sell sweet cream for ice-cream, and still another class sell milk in cities and towns by the quart and pint for family use. But all are not thus favored. Those living remote from these outlets and in the rural districts can not dispose of their milk except it is made into butter, and by the women of the household, and some of them have so many other duties, or are lacking in strength to carry on so much work. The question how shall we make our butter has a two-fold answer. First, the deep, cold, setting process of raising cream is the true method, and is certain to be used by the successful butter-makers of the future. This process is fast gaining favor with the people who are studying ways and means and their own best interests. For family use the cabinet creamery is a labor-saving convenience, by doing away with the washing of a large number of pans; and the milk is excluded from the surrounding atmosphere, filled with its obnoxious odors, and the cream is of a uniform texture and temperature. It ought to be slightly acid to churn and get all the butter.

Once upon a time it was not supposed that any but city people could indulge in the luxury of ice, but it will become an actual necessity in the making of good butter, and no household is properly equipped unless there is a well filled ice house on the premises. Formerly those who styled themselves first-class butter makers, used the method of washing butter with water; but that idea has been exploded. The improved method teaches us to work it, till there is not a vestige of buttermilk left in the mass of butter. The highest type of butter made now-a-days, and which will be the best in the future, is what is called granulated. It has the appearance of kernels of wheat or small sized peas. It is made by using the barrel churn, which has common sense principles about it, namely, concussion, with no wheels or paddles to break the granules or spoil the texture. The second answer to the question is a pleasing one, because it takes off so much of the dirt, drudgery, and care from us women. It is the coöperative, or neighborhood creamery. All through the west the coöperative creamery is being established, and the products of these institutions are commanding high prices, and getting the monopoly of the trade. Dairy butter, or that made on the farm, cannot compete, either in quality or quantity with it at present. Creamery butter is constantly quoted from three to ten cents higher than dairy butter.

It would not be considered economy or labor-saving for each farmer to own a threshing machine, clover huller, or small grist-mill, and to do his own work. It is better that men who understand and like the business, should own their creameries and do the work for the neighborhood. This theory will apply to the dairying industry. At the creameries it is supposed that a skillful person will be employed, who makes that his sole business. His time, attention, and care are not distracted by a series of different duties. Creamery

butter is of a uniform grade, color, and texture, and will command the highest market price. In Iowa there are seven hundred of these coöperative creameries, while there are only eight in Michigan! Why is it that Michigan is so far behind her sister State? Surely, it is not because we have not as good grass land and pasturage, or pure water, and as much wealth to set in motion this branch of industry. And truly we have men of brains and good executive ability, to manage affairs judiciously.

This subject needs agitation until some action is taken. It is a future necessity. Then why not establish creameries in different localities all over our beautiful, rich State, to meet the demand that is already forcing itself upon us? Why not, gentlemen of this Association?

AGRICULTURAL FAIRS.

Mr. Frank Little, of Kalamazoo, in his annual report as Secretary of the State Association of Agricultural Societies, spoke as follows on the manner of conducting agricultural fairs:

Agricultural societies are expressly organized for the advancement and promotion of agriculture—a distinct and important branch of human industry—and they should be mainly educational in character.

It is their mission to elevate the general tone and thrift of the farming class; to illustrate new methods; to awaken new ambitions; to aid the introduction of improved stock, and of new varieties of seed; to exhibit in an attractive way and upon a grand scale, the agricultural products and resources of the locality; and, as public institutions so organized and so conducted, they are certainly deserving of a liberal support.

In furtherance of these objects, and to promote unity of action, the “Michigan State association of agricultural societies” was formed. It is an open, voluntary organization, and it seeks to embrace a full representation from every agricultural society in the State.

Its principal objects, concisely stated, are: To secure a more uniform practice in the management of fairs. A free interchange of views and comparison of methods. The adoption of such general rules and regulations as may seem expedient, and the discussion of such questions as the exigencies and interests of agriculture may from time to time require.

This outlines to you, gentlemen, the important work that is before us. As we meet in convention to-day, as representatives of our several societies, to take under consideration many important questions, may we appreciate the objects and the responsibilities involved. May we divest ourselves of prejudice, bigotry, and intolerance of opinion; and may we conscientiously, cordially, and fraternally enter upon the duties of the hour. I am proud to note that our conventions in the past have been models of good order, gentlemanly courtesy, and a kindly, charitable regard for the views and opinions of others. In all our discussions there has been no clamor, malice, or evil-speaking; no acrimony in debate; but good will and a general good feeling has prevailed throughout our deliberations.

Agricultural societies are, as a rule, organized upon a common basis; they have certain wants in common, and they all, theoretically, strive after the accomplishment of the same general results. In our proceedings we cannot adopt an inflexible set of rules, applicable to all. Circumstances differ, and each society of course is free to control its own affairs independent of others. There are many topics of general import, however, that may be profitably considered by us. The following are respectfully suggested:

- 1st. As to the qualifications, fees, duration and privileges of membership.
- 2d. Exhibitors, their fees, prerogatives and privileges defined; shall they be considered, or required to become members.
- 3d. Time of closing entries; a rigid or lax enforcement of the rule; punctuality secured.
- 4th. Refusal to receive animals or articles for exhibition, that have been withheld until the books are closed and the fair opened.
- 5th. Requiring all animals and articles entered to be on the ground and in position, at the latest, on the evening of the first day.
- 6th. A full descriptive tag, for the information of the public, to be conspicuously attached to all animals and articles entered.
- 7th. An equitable schedule of prizes to be offered, without discrimination or bias in favor of any department.
- 8th. Selection of intelligent, uninterested judges, whose award shall be final.
- 9th. Not permitting the removal of animals or articles from the ground until the actual close of the fair on the afternoon of the last day.
- 10th. No special privileges or guarantees to any; equal and impartial treatment of all classes of people.
- 11th. An immediate and full report of the doings of the fair to be made and published by the officers. A copy of same to be sent to the State Board of Agriculture.

Then there is the question of renting space, and licensing to come upon the grounds a miscellaneous horde of showmen, gamblers, bawds, thieves, and rumsellers, to prey upon the young, the innocent, and the unsuspecting. Besides, there are noted bandits, atheists, preachers, assassins, and politicians, ready, for a consideration, to "lecture" the hardy sons of toil, mainly "to draw a crowd." How is agriculture prompted in the slightest degree by baloon ascensions, negro minstrels, harlequin shows, and mountebank performances?

We are free to say, that agricultural societies do not exist for the purpose of furnishing employment and salaries to officers and employes; or to increase the trade of railroads, merchants, hotel-keepers, saloons, boarding-houses; or to grant facilities for foreign and promiscuous shows. Should any society in this State that has been organized for any good purpose allow itself to be, in any measure, controlled by such influences?

Certain philosophers claim that the character of a people may be estimated by their national amusements. Amusements are a matter of taste; and nature and habit have much to do in fixing their quality. Thus it is said that the native Englishman, whether peer, peasant, or laborer, will always sacrifice a day for a horse race or a prize fight. The Frenchman delights in the gayeties of the ball room; the Spaniard in a bull fight; and the Italian in a hand-organ and puppet show. An American woman said "that her husband would sit on a barbed wire fence all the afternoon, and never flinch or move a muscle, to see a base-ball match, or an agricultural 'hoss trot,' but when he went with her to church, he couldn't sit still in a soft cushioned pew fifteen minutes without wriggling and squirming all over the seat." It may be as difficult to explain the phenomenon of this as it was in the case of the boy who asked his father why certain widows were called "grass widows." "That is something I cannot explain to you very well, my son." "Father," said the boy, "I think I know; I guess its a woman whose husband died of the hay fever." The character of the side attractions and amusements that are allowed upon the fair grounds should receive careful attention. An agricultu-

ral fair is not a variety show, a hippodrome, amphitheatre, or a circus. They may pay rent money into the treasury of the society, but it is the price of yielding up what is manly, respectable, and of good report; and striking hands and going into partnership with whisky sellers, gamblers, vagabond organ grinders, and vulgar tramps.

Societies, whether State, district, or county, that prolong their existence from year to year through such agencies, and are not otherwise sustained in attempting to carry out the real principles and objects for which they were formed, rest upon an uncertain and sandy foundation, and their utility and usefulness may well be questioned. While societies cannot meet current expenses and pay premiums without an income equivalent thereto, and certain unobjectional outside attractions may properly be admitted, yet, the nearer agricultural fairs are kept true to name in every particular, the better they will be every way, and their influence more potent. Besides, there is danger that many persons, otherwise interested in agricultural exhibitions, do not attend because certain vulgar shows seem to be the prominent leading features of the fair.

It may be said that officers of fairs, as such, are not special guardians and conservators of public morals, and that the people must take care of themselves inside, as well as outside the fair grounds. Granting this, yet the responsibility rests upon us as good citizens, to protect society from harm in every possible way, and not to lend our influence, approve, or grant facilities for doing aught which tends to undermine, corrupt, and degrade our fellow men. Young people of both sexes, in large numbers, frequent the annual fairs.

A dram-drinking, irreverent, and dissolute society, says: "Let the boys and girls have a good time, they'll soon be old and have trouble enough." In other words, leave them free to consort with low, vicious companions; to drink, smoke, gamble, swear, and idle away their time. Remove them from the influences of a respectable, orderly, Christian home, and away from all parental authority and restraints. Turn them loose upon the town and the more obnoxious and disgraceful their conduct, the better "time" they are supposed to have. Gentlemen, we need to take earnest heed to our ways, lest our agricultural exhibitions cease to exert a healthful influence in community, and, failing to accomplish that for which they were organized, fall under condemnation. A leading metropolitan journal, criticizing the management of some of our western fairs, said: "The complaint has become general that the better class of farmers take little or no interest in agricultural fairs, probably owing to the fact that they have ceased to be agricultural in anything but name." But we at the west are not sinners above all others. Look at Puritan New England.

The New York Tribune, in a recent editorial, headed "The New England Rum Fair," said: "The public appearance of that money-making ring, known as the N. E. Agricultural Society, is confined to an annual fair of a week's duration, but the influence of this autumn debauch is perennial, and may be counted as the most degrading to which the rising rural population of the six States is subjected." The Boston Farmer pertinently asks: "What has the N. E. society accomplished in nineteen years of its existence? It was organized in 1864, for the encouragement of agriculture in all its branches by the application of the best intellectual efforts, and for the exhibition of animals, farm products, and machinery." The Farmer then says: "Take the last fair at Manchester, in September, 1883. Was that show anything to be proud of for the members of the society, the friends of agriculture,

the honest farmer and his family, or any citizen who takes pride in his manhood? Was it not one of the most demoralizing exhibitions ever held in the New England States? There were some fifty places where liquor was sold, and the society probably realized \$1,500 from this source alone." The Vermont Freeman tersely and boldly said: "The farmers of New England want neither schools for gambling or drunkenness, under the guise of agricultural fairs." The Manchester Mirror, published at the place where the exhibition was held, declared "that the fair was a piece of imposition upon the agricultural people." The New York Tribune's editorial then says: "These representations, and their obvious lesson, ought to excite such an avowed disapproval by fathers and mothers, and other guardians of youth, as will compel a discontinuance of the licensed, official prostitution of agriculture to such vile uses. Such a protest is all the more important in view of the fact, that the founder and constant head and front of the offending New England Society is the nation's official farmer,—the commissioner of agriculture at Washington—better known as the Ishmael of Sorghum; and thus its doings are made to reflect discredit on the farming interests, not of six States alone, but of the entire country."

Let us in Michigan be warned in time, and escape, if possible, the odium that seems so richly deserved, that has been heaped upon the New England society.

At Oshkosh, Wisconsin, last fall, the officers of the fair refused the munificent sum of \$1,000 for the exclusive privilege of running a "wheel of fortune" on the ground. This decision of the officers coming to the knowledge of the citizens of the place, a purse of \$1,000 was immediately made up and presented to the society. Would that, in like manner, the farmers, business men, and citizens of every county in the State appreciated and were disposed to aid their respective societies; thereby removing a strong temptation, and leaving officers of fairs without the shadow of an excuse, for leasing the grounds for unlawful and disgraceful uses.

Speaking of the "wheel of fortune," as a mechanical device to steal money with, it is contrived so that it never revolves upon an even chance, but constantly wins more money than it loses—the \$1,000 license fee paid proves this—so that the whole thing is a swindle, a cheat, and a fraud from beginning to end.

MICHIGAN STATE AGRICULTURAL SOCIETY.

PROCEEDINGS AND REPORTS FOR THE YEAR 1883.

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Agricultural—J. L. Mitchell.

Machinery—Wm. Chamberlain.

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General Superintendent—E. O. Humphrey.

Chief Marshal—A. O. Hyde.

PROCEEDINGS OF THE MICHIGAN STATE AGRICULTURAL SOCIETY FOR THE YEAR 1883.

MEETINGS OF THE LOCATING COMMITTEE.

KALAMAZOO HOUSE, }
Kalamazoo, March 1st, 1883. }

At a meeting of the locating committee held this date, the following named members of the committee were present: President Fralick, Treasurer Dean, Messrs. Cobb, Hyde, Sterling, and the Secretary. The president called the meeting to order at eleven o'clock A. M., and stated the object of the meeting, viz.: To visit the Kalamazoo fair grounds, to look after the improvements and repairs necessary to the holding of the annual exhibition on said

grounds, and to receive and consider proposals from localities desiring to have the next fair.

Mr. Buckhardt, treasurer of the Kalamazoo citizens' committee, stated that the committee had received subscriptions to the amount of (\$2,000) two thousand dollars, and were confident of raising (\$500.00) five hundred dollars more.

Mr. Dean suggested that the committee make a proposal stating what grounds, buildings, privileges, etc., they would grant the society, if the fair was located at Kalamazoo.

Mr. Humphrey, chairman of the citizens' committee, said that Messrs. Stockbridge and Egleston would give the use of the grounds with improvements. Mr. Egleston stated that they would give the society the use of the grounds for one or a term of years, and would move the old Art Hall if necessary.

President Fralick said that it was customary for the society to negotiate with one party or committee, and suggested that the citizens' committee, the County Agricultural Society, and Messrs. Stockbridge and Egleston appoint one person or committee to deal with the society.

Mr. Humphrey was in favor of turning the money subscribed over to Messrs. Stockbridge and Egleston, with authority to arrange with the society.

Mr. Little, from the County Agricultural Society, concurred with Mr. Humphrey.

Mr. Sterling suggested that the most desirable proposal would be one designating what grounds, buildings, stalls, etc., would be furnished, and giving the Society the privilege of putting up and removing such additional buildings as they deem necessary.

Mr. Sterns and Mr. James Cobb spoke in favor of such a proposition. It was then moved and supported that the locating committee prepare specifications of requirements for the citizens' committee to enable them to make a definite proposition. Carried. Mr. Cobb moved to take a recess until 2 o'clock. Carried.

Afternoon Session.

Committee reassembled at 2 o'clock. President Fralick in the chair.

The specifications of requirements, with an inventory of buildings belonging to the society on the Detroit and Jackson fair grounds, was read and delivered to the citizens' committee. Letters relative to location were received from Detroit and Jackson.

On motion, the committee adjourned to meet at the Russell House, Detroit, March 8th, at 2 o'clock P. M.

HENRY FRALICK,
President.

J. C. STERLING,
Secretary.

RUSSELL HOUSE, }
Detroit, March 8th, 1883. }

The locating committee met as per adjournment, and was called to order by President Fralick.

Present—President Fralick, Treasurer Dean, Messrs. J. M. Sterling, W. H. Cobb, A. O. Hyde, W. L. Webber, W. J. Baxter, Wm. Ball, and the Secretary.

On motion of Mr. Sterling, Mr. Ball was invited to act with the committee as Mr. Smith's proxy.

Upon motion of Mr. Dean, the gentlemen from Jackson present at this meeting were invited to address the committee. The invitation was accepted.

Mr. Clark made a few remarks, and presented a proposition from the citizens of Jackson offering the society the use of their fair grounds and buildings, in suitable condition and repairs, for the purposes of the fair.

Mr. Parsons offered for the citizens of Detroit to give the society \$4,500.00 for building purposes; the buildings to be left on the grounds when the fair is over.

Mr. Clark asked that the citizens of Jackson be informed when the society is ready to receive propositions for a permanent location, as they have a proposition to offer.

Mr. Parsons presented a proposition, signed by Messrs. Geo. Hendrie, C. J. Whitney, and P. Parsons, offering the society \$5,000.00 cash, with no restrictions, as an inducement to locate the next fair at Detroit.

On motion a recess was taken until 8 o'clock P. M.

Evening Session.

The committee reassembled.

Mr. Cobb asked that the fair be held at Kalamazoo, and presented a proposition offering the society the use of the Kalamazoo fair grounds, containing sixty acres, one hundred and fifty horse stalls, grand stand, five hundred feet long, judges' stand, president's, treasurer's, and secretary's offices, horticultural and agricultural hall, in good repair, water fee, \$3,000.00 in cash, and usual village privileges.

Mr. Webber offered the following, which was adopted:

Resolved, That the president be requested to take such action relative to the matter of the death of cattle during the last State Fair as will advise him whether the disease was contagious, and that he take such precautions for the coming fair as will best preserve the stock which may be exhibited from danger.

The committee then adjourned to meet at Russell House, Detroit, Thursday, March 15th, at 2 o'clock P. M.

HENRY FRALICK, *President.*

J. C. STERLING, *Secretary.*

RUSSELL HOUSE, }
Detroit, March 15, 1883. }

Locating committee met pursuant to adjournment, President presiding.

Present—President Fralick, Treasurer Dean, Messrs. W. H. Cobb, A. O. Hyde, J. M. Sterling, Wm. Ball, E. O. Humphrey, Philo Parsons, and Secretary.

On motion of Mr. Dean, Messrs. Ball, Humphrey, and Parsons, were invited to act with the committee.

Mr. Bush, representing Messrs. Stockbridge and Egleston, invited the society to hold its next fair at Kalamazoo, and offered to furnish grounds for two years to erect all buildings required by the society for such exhibition, the society to give them all buildings on the Detroit and Jackson fair grounds belonging to them, pay transportation on the same to Kalamazoo, and to pay \$5,000 in cash.

Mr. Parsons spoke in favor of locating the fair at Detroit for one year, and renewed the proposition made at previous meeting.

Mr. Clark favored Jackson as the place for holding the next annual fair, and amended his former proposition by adding three acres more of ground.

Mr. Ball spoke in favor of Detroit. Messrs. Humphrey and Cobb each favored Kalamazoo, giving reasons, etc.

After some debate upon the question of location, a recess was taken until 7 o'clock P. M.

Evening Session.

The committee reassembled at the hour appointed; same members present as at previous session, save Mr. Parsons.

Owing to the absence of Messrs. Webber, Baxter, and Smith, members of the committee, it was thought best to take no definite action, and on motion the committee adjourned, subject to the call of the President.

HENRY FRALICK, *President.*

J. C. STERLING, *Secretary.*

RUSSELL HOUSE, }
Detroit, March 22, 1883. }

Locating committee met pursuant to the call of the President:

Present—President Fralick, Treasurer Dean, Messrs. W. A. Cobb, A. O. Hyde, F. V. Smith, J. M. Sterling, W. L. Webber, W. J. Baxter, and the Secretary.

A proposition was received from citizens of Kalamazoo, signed by W. H. Cobb, and was read as follows:

Kalamazoo will furnish grounds for two years with privilege of returning at any future date. Track, grand stand, judges' stand, 150 horse stalls, secretary's and treasurer's offices, water, and usual village privileges; will take down the society's buildings in Detroit and Jackson and put them up on Kalamazoo grounds; said buildings to remain on the Kalamazoo grounds; the society to pay all freight on buildings moved.

The Jackson proposition was again read. Mr. Parsons added \$250 to the Detroit proposition, making total \$5,250 offered.

Mr. Webber moved to proceed to an informal ballot. The motion prevailed.

Mr. Hyde spoke in favor of Detroit. Mr. Parsons concurred with Mr. Hyde.

After a lengthy discussion indulged in by all members present, a ballot was had, which resulted as follows: Kalamazoo 3, Detroit 3, Jackson 2.

On motion a second informal ballot was taken, resulting as follows: Detroit 5, Kalamazoo 3.

It was then moved and supported to proceed to a formal ballot. Carried. Vote—Detroit, 5; Kalamazoo, 3.

On motion of Mr. Webber, the president, chairman of the business committee, and chairman of the transportation committee were instructed to contract with the Detroit committee, provided satisfactory arrangements can be made with railroads, city council, etc.

On motion, adjourned.

J. C. STERLING,
Secretary.

HENRY FRALICK,
President.

DETROIT, *June 1st., 1883.*

Meeting of locating committee.

Present—President Fralick, Treasurer Dean, Messrs. J. M. Sterling, W. H. Cobb, A. O. Hyde, F. V. Smith, and Secretary.

The special committee appointed to arrange with Detroit city council, railroads, etc., reported that satisfactory arrangements had been made, and upon motion, the 34th annual fair was located at Detroit.

Plans and specifications for president's and secretary's offices and ladies' cottage were offered by J. J. Stevens, and, on motion, adopted.

Moved and supported that an appropriation of eight hundred dollars be made for a military prize drill to take place during the fair, and the amount be expended under the direction of a special committee. The motion prevailed.

It was then moved and supported that the secretary and business committee act as such committee. The secretary asked to be excused from serving as chairman. The request was granted.

On motion of Mr. Dean, the business committee and secretary were appointed military committee with power.

On motion, Treasurer Dean was added to the committee.

Mr. Sterling, chairman of the transportation committee, reported that the railroad track to fair grounds would be ready for freight on the 10th inst.

Chairman Cobb reported stalls at Jackson all down and ready to be shipped.

Upon motion, the treasurer was requested to collect the Detroit subscription. Meeting adjourned.

J. C. STERLING,

Secretary.

HENRY FRALICK,

President.

LANSING MEETING.

HUDSON HOUSE,
Lansing, June 12th, 1883. }

The executive committee met and was called to order at eight o'clock, P. M., President Fralick in the chair.

Roll called, and the following named members found present: President Fralick, Messrs. Hanford, Ball, Lessiter, Cobb, Mitchell, Hyde, Reed, Burlington, Wood, Chamberlain, Parsons, Howard, Harrison, Shoemaker, Baxter, Secretary, and Messrs. J. M. Sterling and I. H. Butterfield, who came in later. Letters from Ex-Presidents Webber and Phillips, saying business engagements at home prevented their attending the meeting, were read.

President Fralick read a communication from Secretary of State Conant, requesting the Society to issue complimentary tickets to each of the crop correspondents.

Mr. Baxter moved that the request be granted. Remarks were made by Messrs. Baxter, Chamberlain, Wood, Cobb, and Hanford of the committee, and Mr. Hewitt, from the Secretary of State's office.

The motion was carried.

Mr. Harrison tendered his resignation as a member of the committee. Mr. Wood moved to accept the resignation—carried.

Mr. Chamberlain moved to proceed to fill vacancy caused by Mr. Harrison's resignation—carried.

Mr. Harrison proposed the name of C. W. Young, of Paw Paw, and Mr. Young was duly elected.

Mr. Baxter moved and it was supported that a committee be appointed to take action on the death of Mr. John Starkweather.

The motion prevailed, and Messrs. Baxter, Shoemaker, and Mitchell were appointed such committee.

Mr. Cobb, chairman of the business committee, reported Jackson buildings all taken down, eleven cars loaded, and about five cars more to load; lumber for president's and secretary's offices, ladies' college, express and police offices, and lunch-room purchased; track on Detroit grounds worked, Second street closed, and work progressing. That he had sold part of the Jackson sheep and swine pens to the Jackson County Agricultural Society for \$50.

Prof. J. C. Holmes invited the committee to attend the meeting of the State Pioneer Society now in session, and to become members of that society.

Dr. Gibson invited the committee to meet with the State Horticultural Society at Ionia, June 26th and 27th.

The invitations were received with thanks.

The Military Committee reported that several companies had agreed to take part in the drill; that all companies in the State had been invited to participate.

Mr. Dean, chairman of Printing Committee, reported five thousand copies of the Premium List printed; part of them distributed.

An invitation to visit the Agricultural College on the 13th of June having been accepted during the last winter meeting, it was on motion resolved to start for the college at 8:30 o'clock to-morrow A. M.

Mr. Parsons moved that an invitation to attend the fair be extended to President Arthur. Carried.

On motion of Dr. Mitchell, Governor Begole was invited to attend the fair.

Mr. J. M. Sterling, chairman of the Transportation Committee, reported usual railroad arrangements completed.

On motion a recess was taken until 8 o'clock Wednesday A. M.

WEDNESDAY, June 30, }
8:30 o'clock A. M. }

Committee resumed.

The committee appointed to prepare resolutions upon the death of Mr. Starkweather reported as follows:

WHEREAS, Since the last meeting of this Executive Committee, John Starkweather, of Ypsilanti, a former member and active co-worker, has passed over the dark river;

Resolved, That this committee desires to place on record its appreciation of the valuable services rendered to the State Agricultural Society by the late John Starkweather while a member of this committee—while the Society was young and struggling with difficulties and of the interest he continued during his after-life to manifest in its growth and prosperity.

Resolved, That we extend to the family of the deceased our condolence and sympathy.

Adopted unanimously.

Mr. Baxter then offered the following, which was adopted unanimously by a rising vote.

Whereas, Our friend and fellow worker, C. A. Harrison, has resigned his position as a member of this executive committee and is about to remove from our State;

Resolved, That we grievously regret the severance of his connection with the committee; that we have ever found him prompt, earnest, and efficient, a very pleasant friend and associate, and an affable and courteous gentleman.

Resolved, That he will bear with him to his new home our best wishes for his prosperity and happiness, and should he ever find Connecticut too narrow for him, he will ever find a welcome among his present associates in our broad and beautiful State.

The committee adjourned to visit the college.

J. C. STERLING,
Secretary.

HENRY FRALICK,
President.

MINUTES OF MEETINGS DURING FAIR HELD SEPT. 17-21, 1883.

RUSSELL HOUSE,
Detroit, Monday, Sept. 17th, 1883. }

The executive committee met at 8 o'clock P. M.

President Fralick in the chair.

Present—President Fralick, Treasurer Dean, Messrs. Angel, Howard, Hanford, Reed, Wood, Smith, Burrington, Ball, Anderson, Young, Sterling, Mitchell, Hyde, Cobb, Rising, Parsons, Lessiter, Butterfield, Chamberlain, Baxter, Phillips, and the Secretary.

Mr. Parsons read a communication from the Detroit Truck Company as follows:

Philo Parsons, Esq.:

DEAR SIR:—Will you kindly see that we are provided with a few tickets admitting our truckmen (the Detroit Truck Co.) to the fair grounds, so as to permit them carrying on their business. We ask this so as to be assured of admittance, for since the arrival of goods at the fair grounds, great discrimination has been exercised against us; most unfair treatment, you will allow, considering that we are annual subscribers to the association.

We are not allowed to truck goods of our steady customers even. An instance: Mr. W. S. Penfield had some car-load lots for exhibition, and, acting under our usual verbal order from him, we prepared to haul the same, only to be prevented doing so by Mr. Benham, acting under instructions, as he said, of Mr. Sterling and the executive committee. All stuff that comes in care of the association we are rigidly prevented from touching. All we want is a share. In Mr. Hendrie's absence we appeal to you to see that we get at least a share. We have the best of facilities for doing this work, and although things are by now well moved in we will, if put on even terms with other people, get some of the hauling out. If possible please send the tickets asked for to our office Monday a. m., so that we may be assured that the ostracism so far practised cannot be carried to the extent of refusing us entrance.

C. CURRIE.

On motion the matter was referred to President Fralick.

Mr. C. J. Whitney invited the committee to attend his theatre this evening. On motion of Mr. Anderson the invitation was accepted with thanks.

Treasurer Dean said that he had received several applications for commutation tickets from manufacturers. The superintendent of public schools had also applied, and asked that some plan to control the issuing of these tickets be adopted.

On motion the matter was referred to the business committee and treasurer, with power.

Moved and supported, to reconsider the question referring the Detroit truck company's communication to the president.

The motion prevailed. The communication was again read, and after some inquiry the matter was, on motion of Mr. Hanford, referred to the president and transportation committee.

The secretary presented a number of applications for entry in the live stock department, which were received by him too late to be entered in accordance with the rules.

Moved and supported that the rules be strictly adhered to. Carried.

On motion adjourned.

The committee was again called to order by the president.

Roll called. Same gentleman present as at previous call.

Moved and supported that the twelfth annual election of officers and ten members of the Executive Committee be held at the office of the Superintendent of Police on the fair grounds, Thursday, September 20. Carried.

Messrs. Adolf Wheeler of Adrian, E. W. Cotrell, Detroit, and M. Dorrell, Jackson, were duly elected judges of election, and the committee adjourned.

J. C. STERLING,

Secretary.

HENRY FRALICK,

President.

Tuesday Evening, September 18th, 1883.

Executive Committee met at 8 o'clock P. M.. President Fralick presiding. Roll called, and the following named members of the committee found present:

President Fralick, Treasurer Dean; Messrs. Sterling, Rising, Hanford, Ball, Lessiter, Cobb, Mitchell, Hyde, Reed, Smith, Burrington, Wood, Chamberlain, Parsons, Angell, Howard, Young, Butterfield, Anderson, Baxter, Phillips, and Secretary.

Mr. A. S. Perrin, Parkville, Mich., stated that he mailed a letter containing entries, at Parkville, September 8, 1883. The letter had not been received by the Secretary, or returned to writer. His horses are on the grounds, and he hoped to compete for premiums.

Mr. Baxter moved that Mr. Perrin be allowed to make a duplicate entry, and that the same be received, provided the gentleman will make affidavit that the original entry was mailed on September 8, as stated. Carried.

The committee was invited to dine at Senator Palmer's on Wednesday evening.

Moved and supported that the invitation be accepted. Carried.

Treasurer Dean reported gate receipts for Monday, \$176.25; Tuesday, \$1,949.25; total for two days, \$2,125.50. Total for Monday and Tuesday in 1882, \$621.75. Grand stand receipts, Tuesday, 1882, was \$1.00; Tuesday, this year, \$89.00.

An invitation to attend the theatre from Manager C. A. Shaw was received and, on motion, accepted with thanks.

Adjourned.

J. C. STERLING,

Secretary.

HENRY FRALICK,

President.

Wednesday Evening, Sept. 19th, 1883.

Committee met at 8 o'clock P. M.

President Fralick in the chair.

Roll called: Present, President Fralick, Messrs. Sterling, Hanford, Ball, Lessiter, Dobb, Wood, Hyde, Reed, Smith, Burrington, Chamberlain, Parsons, Angel, Howard, Young, Butterfield, Anderson, Baxter, Phillips, and Secretary.

Committee on Detroit Truck Company matter offered the following, which was adopted unanimously:

To the Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN:—In compliance with your instructions we have made a careful investigation in the matter of the complaint of the Detroit Truck Company referred to us, and from such investigation we are satisfied that the officers of the Detroit Truck Company have been misinformed as to facts, and that the complaint was made under an erroneous impression as to the action of the society and its officers. While it may be, and no doubt is, true that one truck company has done more hauling of goods than any other, this was the result not of favoritism or of improper discrimination on the part of the officers of the society or of the railroad company, but of legitimate business enterprise on the part of such truck company. A simple statement of facts will be sufficient. On Friday afternoon a large number of cars had arrived filled with articles for exhibition consigned to owners, and marked in care of State Fair. The owners were not here, and could not be found. The goods must be unloaded or taken back to the city and switched onto sidings to make room for other cars constantly arriving. The Riverside Truck Company was on hand in the person of its business manager, and volunteered to take the goods and become responsible for their delivery to the superintendents of the proper departments, and wait for payment of charges until the owners should arrive and pay the same. The agent of the railroad company was satisfied with the security, and delivered the goods; and by working nearly all night the cars were unloaded, and others were also unloaded as fast as they arrived; and the work of getting exhibits in place was thus expedited at least one day. This company, being always on hand, with ample facilities, was given the hauling of such goods as were received when the owner or consignee was not on hand and could not be found after careful enquiry, and further delay would cause great inconvenience. But in all cases where the owner or consignee could be found they were duly delivered to him or to his order.

The case in point, mentioned in the communication, your committee find is a mistaken statement of facts. The committee can not say, except from the statement in the communication referred to them, what company usually do the draying for Mr. Penfield. The Detroit Truck Company applied for the goods, as they stated, on a general verbal order to get and deliver goods for Mr. Penfield; while the Riverside Company presented a written order from Mr. Penfield for those particular goods; and the agent of the railroad company delivered the goods on the written order, and not of his own notion nor according to instructions received from Mr. Sterling or any officer of the society.

The Riverside Company applied for the privilege of a tent on the grounds where they could keep a clerk, take orders, and promptly deliver goods. The privilege was granted, and would have been, and still will be granted to any reliable truck company applying for the same.

In conclusion your committee will state that they are fully satisfied, not only that no undue favoritism has been shown, and no improper discrimination made in favor of or against any truck company by the officers of the society, but that every effort has been made to avoid any reasonable ground for complaint.

Respectfully submitted. Signed by order of committee.

HENRY FRALICK, *Chairman.*

Detroit, September 19th, 1883.

A protest against the award of the viewing committee in Division B, class 12, to pair of matched horses of all work, five years old or over, signed I. Hendricks and John White, was read by the secretary.

Moved and supported that the protest be referred to the superintendents of horse department. Carried.

Moved and supported that the chairman of the business committee shall have charge of the grand stand, and shall decide when admission will be charged. Carried.

On motion, Senator Palmer was invited to dine with the committee on the fair grounds to-morrow.

Mr. Baxter was, on motion, appointed a committee to meet the officers of the Tri-State Fair Association at the Woodward avenue station and to escort them to the grounds.

On motion, half past eleven was fixed as the hour for dinner.

Committee adjourned subject to the call of the president.

J. C. STERLING,
Secretary.

HENRY FRALICK,
President.

Thursday, Sept. 20th, 1883.

President Fralick called the committee to order at 8 o'clock P. M.

Roll called. Quorum present.

Supt. Smith reported upon the protest referred to himself and associate.

Protest not sustained. Report accepted and adopted.

A motion by Mr. Smith, asking that the different breeds of draught horses be examined separately, was lost.

Treasurer Dean reported gate receipts for four days as \$21,300; receipts for first four days last year, \$16,422.75; difference in favor of this year, \$4,577.25. To-day's receipts were \$9,481.96.

Superintendents of departments reported work of awarding committees about finished.

A protest from Mr. Esler against award in poultry department was read and upon motion referred to Supt. Burrington with power.

ELECTION OF JUDGES.

The judges of election submitted the following report:

Whole number of votes cast three hundred and thirty-one (331).

For President—

Philo Parsons, Detroit, received.....	299
Henry Chamberlain, Three Oaks, received.....	27
Scattering.....	5
	<hr/>
	331

For Treasurer—

A. J. Dean, Adrian, received.....	331
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For Secretary—

J. C. Sterling, Monroe, received.....	330
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For Member of Executive Committee—

Abel Angel, Bradley, received.....	331
D. W. Howard, Pentwater, ".....	331
H. O. Hanford, Plymouth, ".....	331
F. L. Reed, Olivet, ".....	331
A. F. Wood, Mason, ".....	331
F. V. Smith, Coldwater, ".....	331
J. Q. A. Burrington, Tuscola, ".....	331
M. P. Anderson, Midland, ".....	331
John Gilbert, Ypsilanti, ".....	331
C. W. Young, Paw Paw, ".....	331

HENRY FRALICK, *President.*
ADOLF WHEELER,
OLIVER JOHNSON,
WM. HEYWOOD,
Inspectors of Election.

Report accepted and adopted.

Mr. Lessiter asked that Mr. Blodgett be allowed to take his swine from the fair grounds Friday noon.

On motion the matter was referred to Supt. Lessiter.

Adjourned.

J. C. STERLING,
Secretary.

HENRY FRALICK,
President.

Friday Evening, September 21st, 1883.

Committee convened at Russell House parlors at 8 o'clock P. M.

President Fralick in the chair.

Upon roll being called a quorum was found present.

Treasurer Dean reported total gate receipts for the year, \$24,591.15; for the day, \$3,291.65.

Supt. Butterfield stated that in class 10, fat cattle, two steers one year old were allowed to compete for the prize for the steer showing the greatest gain in weight for age in days that had competed in the same class for the regular premium, with the understanding that the question whether this should be considered a sweepstakes prize should be referred to the executive committee. The executive committee decided, upon motion of Mr. Wood, that the prize is not a sweepstakes prize.

The same superintendent then reported that a herd of "Guernseys" exhibited by Mr. C. H. Gibbs, Pontiac, Mich., was a fine herd. The judges had recommended a discretionary premium on the same. The superintendent concurred with the judges, and recommended that the amount of the premium be \$25. On motion, the report of the superintendent, with recommendation, was adopted.

Mr. Burrington, to whom was referred the protest of Mr. Esler, asked for further time to report. Granted.

A protest against the award of the viewing committee on Mr. Hendricks's team, entered in class 12, was read, and upon motion referred to Supt. Smith.

A protest by Dickerson & Co. against the award of committee on display of furs was read by the secretary. Protest not sustained.

Superintendent of division A, cattle, reported regular premiums awarded \$3,377; discretionary, \$25; total, \$3,402. Report accepted and adopted.

Superintendent of division B, horses, reported total premiums awarded, \$2,696. Accepted and adopted.

Superintendent of division C, sheep, reported total awards as \$1,314. Accepted and adopted.

Superintendent division D, swine, reported total amount of premiums awarded, \$586. Accepted and adopted.

Superintendent of division E, poultry, reported regular premiums awarded, \$280; discretionary premiums recommended, \$9; total, \$289. Report with recommendations adopted.

Superintendent of division F, farm and garden products, reported regular premiums awarded, \$211; discretionary premiums recommended, \$5; total, \$216. Adopted with recommendations.

Superintendent division G, dairy and other products, reported regular

premiums awarded, \$215; premiums recommended, \$11; total, \$226. Report with recommendations adopted.

Superintendent Division H, Bees, etc., offered the following report:

A very competent committee of experts made a careful examination of all articles on exhibition, and awarded premiums. The display in several classes was such that the committee have earnestly recommended a second premium, when but one was offered, in which recommendation I fully concur; but the following are recommended on enumerated articles, and cannot be allowed under Sec. 5, Div. 7, of Rules on page 16 of Premium List, viz.: Display of Queen Bees under glass, \$3.00; collection of Apiarian Implements, \$5.00; collection of Bee Literature, \$4.00.

But for the above rule I should unhesitatingly endorse the recommendation of the committee on the above articles.

The following discretionary premiums are recommended on non-enumerated articles, and I fully endorse the same:

Pump for controlling swarms.....	\$2 00
Queen-excluding honey-board.....	2 00
Folding tent for holding bees.....	2 00
Bee feeder.....	1 00
Can for holding section boxes.....	1 00
Bee veil.....	1 00

Total discretionary.....	\$9 00
Regular and discretionary premiums.....	201 98

W. J. BAXTER, *Supt.*

Accepted and adopted.

Report for Division I—farm implements; no premiums offered, none awarded; exhibition very satisfactory. Accepted.

Report of Division J—vehicles; two diplomas awarded. Adopted.

Superintendent Division K—machinery—reported good exhibition; no premiums offered; none awarded. Accepted.

Superintendent Division L—manufacturers—reported. Regular premium awarded, \$233, and one medal. Discretionary premium recommended, \$17. One medal and one diploma. Total cash, \$250. Two medals, one diploma. Accepted and adopted, with recommendations.

Superintendent division M, music, reported a very large and fine display in this department. No premiums awarded. Accepted.

Superintendent Division N, art, reported regular premiums awarded \$374; recommended, \$26 discretionary; total, \$400. Report accepted and adopted with recommendations.

The Secretary read report of superintendent of Division O, needle work, showing amount of regular premiums awarded \$203.50; recommended on non-enumerated, \$61; total cash, \$264.50, and one diploma regular. Report with recommendations adopted.

Superintendent of division P, miscellaneous, reported regular premiums awarded amounting to \$35; discretionary premiums recommended, \$28; total, \$63.

Report of superintendent division Q, children's department, read, showing premiums awarded on enumerated articles to be \$8.50. Accepted and adopted.

Superintendent of forage reported amount paid for hay and straw, \$1,667.98.

Superintendent of gates reported work all finished satisfactorily.

Superintendent of police reported all quiet, but seven arrests made. Accepted.

Superintendent Howard reported upon claim of Montgomery and Westfall, referred to him at winter meeting, that he had investigated the matter and found that owing to a mistake of the awarding committee two premiums amounting to \$15 were marked to Mrs. Ann Newton on sheep that were not

shown in the ring at all. The same should have been awarded to Montgomery & Westfall. Report accepted and adopted.

On motion the secretary was instructed to withhold \$15 of the premiums awarded to Mrs. Ann Newton this year, and pay the same to Messrs. Montgomery and Westfall.

The following report was received from Secretary of State Conant, read, accepted, and placed on file.

Hon. Henry Fralick, President Michigan State Agricultural Society :

SIR:—I have the honor to report that in conformity to the resolution adopted by the executive committee of your society there were issued by me to crop correspondents 179 tickets of admission. In order to test the question as to whether the policy of your society in granting this privilege to crop correspondents was not only a benefit to the agricultural interests of the State, but also a direct advantage to the fair, I have questioned nearly all of the correspondents admitted to the grounds and find that there have 327 persons attended the fair (many of them entering the gate a number of times) who would not have come but for the direct influence of the correspondents. There is no doubt but that this influence, favorable to the Michigan State Agricultural Society, has extended further than I have been able to trace it, as the action of your society has awakened a feeling of the warmest cordiality in the hearts of the fourteen hundred crop correspondents in the State, and although only 179 of this number were able to accept admission, they have still shown their appreciation of the gift by exerting their influence for the material advantage of your society.

Please accept at the same time my sincere thanks for the great benefit that this arrangement has been to the department of State, and believe me,

Yours very truly,

H. A. CONANT, *Secretary of State.*

On motion, it was resolved that the thanks of the executive committee be and are hereby tendered to Senator Palmer for the hospitable and elegant manner in which they were entertained at his house on Wednesday evening. Adopted.

The following resolution was unanimously adopted :

Resolved, That the thanks of this society are due, and are hereby most heartily extended, to the police department of the city of Detroit for their action in detailing an efficient and at the same time very courteous force for service at the fair grounds; which has secured quiet, order, and general good conduct on the grounds, and has been of special assistance to the superintendent of gates, the marshal, and superintendent of police.

Resolved, That the thanks of this society are also due, and are hereby most heartily extended, to the general managers and superintendents of the various railroads of the State for the great interest they have taken in the fair, and the efforts they have made to add to the exhibition and attendance, and for the special privileges extended in the matter of bringing exhibits free of charge and granting half fare rates. The railroad companies of Michigan have in all their dealings with this society shown themselves to be heartily in sympathy with the great interests we have in charge.

Resolved, That the thanks of the society are hereby given to the representatives of the press of the city of Detroit and State of Michigan for their attendance and full and faithful reports of the fair.

Mr. Chamberlain gave notice that he would ask for a vote on the question of changing the date of the winter meeting, at the next annual meeting of the society.

On motion of Dr. Mitchell, it was voted that the business committee be authorized to dispose of the buildings and lumber on the Detroit fair grounds as soon as practicable.

A communication from Secretary Farnsworth, inviting the committee to visit the art loan this evening, was read by the secretary, but owing to the lateness of the hour was declined with thanks.

On motion the committee adjourned.

J. C. STERLING,
Secretary.

HENRY FRALICK,
President.

PROCEEDINGS OF THE EXECUTIVE COMMITTEE AT THE ANNUAL WINTER MEETING.

FIRST DAY.

RUSSELL HOUSE, }
Detroit, January 14, 1884. }

The regular annual meeting of the Executive Committee of the State Agricultural Society was called to order at 8 o'clock P. M., President Fralick in the chair.

The roll was called and the following named members found present:

President Fralick, Treasurer Dean, Messrs. Sterling, Hanford, Ball, Lessiter, Cobb, Hyde, Reed, Smith, Burrington, Wood, Chamberlain, Parsons, Angel, Young, Butterfield, Anderson, Shoemaker, Baxter, and the Secretary. Messrs. Phillips and Rising came in late.

President Fralick read his address and invited the President-elect to the chair.

ADDRESS OF PRESIDENT FRALICK.

Gentlemen of the Executive Committee of the Michigan State Agricultural Society:

Retiring at this time from the office and duties of president of this society, I will give you a brief review of its proceedings for the last year, and submit some remarks and recommendations which, I believe, will promote its healthy progress and enure to its benefit, and then leave the field for my able and experienced successor.

I feel it a cause of congratulation to the officers and members of the society that, notwithstanding some unfavorable weather, our last fair was undoubtedly the largest and best exhibition and in most respects the best fair the society has ever held, although not the greatest in a net financial point. The attendance and receipts, considering that we had two unfavorable days, were very large, but the unavoidably large expenditure for buildings and fixtures reduced the net receipts very much; but after *all is paid* the nice sum of \$2,758 will be added to the present surplus, which will then make the round sum of about \$26,000, besides the premium on \$10,000 of U. S. 4 per cent bonds. The report of the treasurer, which is as usual full and complete, will give you the exact figures. This sum makes the society very easy in their finances, but no less economy or careful expenditure of the money of the society should be permitted. The amount of the premiums offered and paid in 1883 considerably exceeded those of 1882, and I respectfully recommend a careful revision of the premium list of 1883, and that a reasonable addition thereto be made, either in new premiums or increased old ones, whereby, in the judgment of the committee, the best interests of the society and people of the State will be wisely promoted.

EXHIBITORS' TICKETS.

At our last winter meeting you directed a change made in regard to entrance tickets for exhibitors and their attendants. A separate gate was set apart, at which all holders of such tickets were required to enter. The rule was very well complied with and enforced, and resulted in undoubted benefit to the finances of the society: for, while the exhibition and the number of exhibitors and help was very much larger than at Jackson the preceding year, the number of tickets issued for their *free* admission was 1,430 less than for the previous year of 1882. I respectfully recommend, with some slight changes, its continuance.

PREMIUM LIST.

In the large exhibition of Norman Percheron and Clydesdale horses last fall, there was a considerable embarrassment caused to the viewing committee to classify those breeds of horses by our premium lists, and I recommend their careful revision in that respect, and think a new class or two in that department will be found not only desirable but necessary.

I think the expense of the society would be lessened and the exhibition improved, by striking out all fourth premiums wherever they occur in the list of 1883, as those premiums, especially in the stock department, in my judgment tend to induce the exhibition of stock for which room and forage must be provided without *merit* in the animals.

There is still quite a large portion of our halls used by exhibitors who bring their goods principally for advertising purposes. The cost to the society for furnishing this space is generally much greater than the amount of premiums offered, and I advise that hereafter *no* premiums be offered for such goods or articles. We provide the room and opportunity, that class of exhibits will generally be sufficiently large without premiums.

JUDGES AND AWARDED COMMITTEE.

So much of the good feeling and permanent success of the Society depends on the ability and impartiality of the judges selected, that I feel the subject cannot be too strongly impressed on *all* superintendents to select and engage their awarding committees prior to the meeting of the fair (which our rules now permit). When that important duty is carefully and conscientiously performed, and in sufficient time to verify their acceptance of the trust before the commencement of the fair, it saves much embarrassment and annoyance, and gives the best opportunity to get the most suitable persons for the duties required of them.

GENERAL POLICY.

The officers of the Michigan State Agricultural Society, acknowledge their responsibility to the people of the State for the proper conduct and management of the society, not only in a business but in a moral point of view, and for the proper accomplishment of that object they have adopted rules for their government and direction, which the judgment of those of long and successful experience in their management of fairs approve, and then adhere to and enforce to the best of their ability, which I am confident the result of the order on the grounds and success of the fairs, abundantly proves were faithfully performed. In many respects our rules are very stringent. They prohibit the selling, giving away, or keeping on the premises of any *intoxicating drinks, pool selling, horse trotting or running for money stakes, gambling* in any form, immoral or improper exhibitions of any kind, under the penalty of forfeiture of all rentals paid and immediate vacation of the grounds. Innocent amusements and exhibitions are permitted, such as in our judgment are inoffensive, but to a large number of our visitors are entertaining, but all such are kept under close supervision and are summarily dealt with for any violations of the rules. While the fair last fall was very large not only in exhibits but in attendance and held within the limits and easy access of a large city, and attended by thousands of all *classes of people*, still the order on the grounds and general conduct of our visitors was remarkably good, and the law and rules generally cheerfully observed without question, which speaks very highly in favor of the intelligence and order-loving people of the State.

Our annual meeting held last June at Lansing, and visit to the Agricultural College, and with the State Board of Agriculture, was very pleasant and agreeable, and trust both the society and the college will be benefited by the meeting. The usual report of our special committee on the college will be made to this meeting. The State Horticultural Society, considering the very unfavorable year for fruit, made a very creditable exhibition, and it was quite an attractive feature of the fair, and trust the usual appropriation in their favor will be made and their co-operation continued.

On receiving a notice from the U. S. Commissioner of Agriculture, that a meeting of delegates from the several States would be held at Chicago Nov. 15, 1883, to take into consideration the animal industries of the country, I appointed I. H. Butterfield, Jr., Esq., and Hon. William Ball members of this committee to represent this State and society at that convention, which they attended, and will make a report to this society of the questions brought before and the action of the convention thereon.

At the request of Hon. H. A. Conant, Secretary of State, we issued to him, to be distributed under his supervision to the various crop reporters throughout the State (who number in all some 1,200) complimentary tickets for admission to the fair for themselves and families, as a slight acknowledgment for their valuable services rendered to the people of the State without other compensation. About 200 tickets were used.

FAIR CIRCUIT.

A meeting of the Ohio, Michigan, and Indiana Fair Circuit delegates was held in Detroit, Dec. 12, 1883, with a full and, in some respects, an important meeting.

This society was represented by Hon. Philo Parsons, J. M. Sterling, A. J. Dean, and J. C. Sterling, who will make a full report of their proceedings, and from which this society will undoubtedly receive some valuable information and suggestions. In their published proceedings I notice several items which I recommend to your careful consideration. "Such as stock sales at fairs. The best means to prevent our stalls and pens being occupied by worthless or inferior animals. The policy of offering large premiums for the exhibition of fat animals at our fairs. The best plan for issuing exhibitors' tickets, and the propriety of adopting a plan of uniformity in the manner of conducting our fairs." These are all questions of importance, and a wise disposition of them will largely enure to the continued and permanent success of our society.

PERMANENT LOCATION.

The large amount of money actually lost to the society yearly, by its present migratory system for holding our State Fairs, is certainly very expensive and unsatisfactory, and should be changed. We have expended the large sum of \$12,000 for buildings and fixtures in addition to the buildings on the grounds, to get ready for the last State Fair, and which have all been sold for \$3,000; the best offer that could be obtained. I can think of no better way than my recommendation of last winter, that was if possible to make some satisfactory arrangement whereby the society may have the necessary grounds and permanent buildings, to occupy in three or four different localities in the State, which may be erected jointly by the State Society and the locality to be occupied by the State Fair one or two years at a time in each place. Such an agreement, wisely made and carried out, would, in my judgment, settle the question of locality, which is always a perplexing one, save a large amount of annual expenditure and trouble to the State Society, and also enable each of said localities with the help of the State Society to erect permanent buildings. Each of the towns would be in competition with the others, to have the best buildings not only as a convenience to the State Society but a pride to the locality. With such an arrangement the difficult and many times unpleasant question of the location of the State Fair, annually, can easily be satisfactorily adjusted and settled. With that accomplished I shall feel that the society has finally solved the problem that has troubled it for many years. After proper grounds are obtained, and the permanent buildings erected in each selected locality, it will be a great saving of expense yearly and relief to the committee, and I trust a permanent benefit to the society.

I tender you, gentlemen, my sincere thanks for your efficient and cordial support in all my efforts to administer the affairs of the society for its true and best interests during my term in office, and for the zeal and promptness with which you have performed all the arduous duties assigned to you as officers and members of this society, and trust that your session will be pleasant and harmonious, and that your labors will result in the continuous and advancing prosperity of the society.

INAUGURAL ADDRESS OF PRESIDENT PHILO PARSONS.

Gentlemen of the Executive Committee of the State Agricultural Society:

I have great pleasure in acknowledging the courtesy tendered me in an election as your presiding officer for the year 1884. It is a mark of confidence and respect most gratefully and highly appreciated. The position is an honorable one, and worthy the ambition of any citizen. My only regret is that I shall bring to the discharge of my duties so little real practical knowledge of the great interests we are seeking so earnestly and successfully to develop and promote, or so little parliamentary experience. I must therefore ask your kind forbearance, with the assurance that you shall have my impartial service in every direction that will further the prosperity of the great institution which has become so endeared to the hearts of the people, and is so manifestly and widely influencing for good all the industrial pursuits and enterprises of this great State. I congratulate you, gentlemen, on the very successful fair of 1883, not more on the results secured, than on the manner of their attainment. It was a model in its perfect harmony and freedom from unpleasant friction in all departments, affording conclusive proof of wisdom in the selection of superintendents and judges, and of their general fairness in the discharge of the difficult and responsible duties devolving on them. The best evidence of their fidelity to the principles underlying our organization, is made apparent by the absence of serious complaint from exhibitors, arrangements for whose accommodations were as nearly perfect as possible on grounds of a temporary character. The business committee was untiring in its efforts to meet every reasonable expressed want, even

at a lavish expenditure of money. The most careful observation has failed to develop any just cause for complaint in any direction. The awards seem to have been made with entire impartiality, and were, as a rule, accepted as fair and equitable. In carefully reviewing the proceedings of the society, with which I have been familiar for the entire thirty-five years of its existence, it appears to me that the fair of 1883 is fully entitled to the rank accorded by the press, and recognized by all who visited the exhibition, in contradistinction from all others, as "The Great Fair." In many respects there was a want, which might have easily been supplied by local interest and effort, but as a whole it more fully reflected the growth in material resources, varied agricultural and industrial improvements, and evidences of increasing wealth and luxury, than any preceding exhibition. No intelligent citizen looking through the great display, in which was concentrated at one point the productive energies of industry, in agriculture, mechanical skill, and the fine arts, in the extent and varied character of the exhibit and its great excellence, could fail to recognize just cause for personal gratulations and pride.

And you, gentlemen, in witnessing the universal, unqualified approval of the multitudes in attendance, must have experienced a sense of individual reward for all your unwearied, unpaid, and too often unrecognized toil in securing a success so grand and satisfactory. The magnitude of the enterprise, and the vast labor involved in the preparation for so large an exhibit, are not appreciated by the multitude. They look at results, and criticise if the least fault is apparent. Regret has been often expressed that the annual fair could not be of longer duration, partaking in some measure the character of an exposition. But when the demand for the daily supplies of so large a number of animals involves so great cost, it would be impracticable, so say the least, were no other impediment in the way, to extend the time beyond a week.

In St. Louis, where the model fair of the country has been held annually for twenty-three years, originated and controlled by her own citizens, of which they may be justly proud, appropriating as they do fifty thousand dollars annually, for premiums, making the occasion a brilliant holiday in every way possible, closing their places of business one day during the fair, that the whole people may see and appreciate the growth and development of that which makes a community rich and great, the Society finds that it is impossible to hold the multitude more than one week. It may be also stated that longer periods have been tried in other places, but as the time was extended, interest has flagged and the conclusion has been reached by experience that an enthusiastic meeting of five or six days is wiser and better than any longer period.

A State agricultural and mechanical show, even though it may include numerous and varied works of fancy and utility in manufacture and fine arts, cannot be considered and is not intended as a general exposition. The fair, embracing in its best aspects, a living picture of superior excellence in our domestic animals, the different and distinct families of breeds—the advances made in valuable specimens, improved or imported—brought together in their perfected character, for comparison and criticism, as well as admiration, must be the leading feature of interest and attraction; not only on account of the vast amount of money involved, reaching seventy-five millions of dollars for this State, but also as object lessons, stimulating to the highest endeavor.

To the practical farmer and political economist the display of farm machinery in its great variety all tending to lighten labor and promote better cultivation of soil or more rapid security of ripened harvest, affording as it does in the presence of competing examples, opportunity for practical tests, must be a means of instruction and advantage not otherwise attainable.

The numerous productions of the farm, the garden, the orchard, and the dairy concentrate at the annual meeting of the State Agricultural Society in its fair, an interest which should bring together practical farmers in much larger numbers from every section of the State.

There is still a class of farmers among us who are slow to adopt improved animals or modern methods. They travel in the paths of their ancestors, using tools made sacred by early association, and recognizing native animals as meeting their full requirements. But the influence of our annual fairs and the great flood of light which is thrown upon the varied operations of the farm, and its capabilities for production by other organizations throughout the State is so pervading in its character, that slow-going farmers must resort to frontier life or fall in the race of competition.

Our immense annual outlay for buildings which are of little value unless the fair is held continuously at one place has come to be a question of serious importance.

The aggregate contributions of Detroit alone to secure the fair at various times during the past thirty-five years with the interest, approximate \$60,000, the half of which judiciously invested, in the early history of the Society, would have secured valuable and substantial brick structures and the land on which to locate them.

In view of our increasing expenditures which cannot well be lessened in a State growing so rapidly as Michigan, I submit whether it may not be wise to take into thoughtful consideration the question of a permanent location, thereby saving the great waste of our migratory methods.

I am aware that the object of the Society is not to accumulate money, but to educate and stimulate to high endeavor. To that end heretofore we have moved around always with marked benefit to the community that has secured the exhibition. A leading citizen of Saginaw county assured me that the farmers of that region had been benefitted many times the cost of the display by improvements resulting directly from its educating influence, and so in other localities. But has not the time arrived when the best interests of the Society dictate the ownership of suitable grounds, wisely located for its own accommodation? More substantial and appropriate structures are demanded by the improving taste and wealth of the country not only for the more convenient care and comfort of animals on exhibition, but for the display of machinery, manufactures, and the fine arts.

The cost to the exhibitor of making suitable preparations deters many from showing articles that would greatly enhance the interest of such an occasion. Unplanned boards do not present a very attractive background for works of artistic merit, and little can be realized in comparison with what might be accomplished if the buildings were permanent. With an established location some regard might be had to the arrangement of grounds, with avenues ornamented with the elm and maple, and with the needed structures effectively placed and painted, if the question of stability was settled. An apprehension exists that a fixed location would withdraw interest from the State to district organizations, but such has not been the experience in other States. In Ohio the State fair was migratory for more than twenty years, and of limited influence, but with a permanent location at Columbus, on grounds controlled by the Society for the past ten years, the institution has been increasing in interest, attendance, and wealth, and the expenses have been materially reduced. That State appropriates annually six thousand five hundred dollars for the salaries of officers, and for crop reports, which are made by the officers of the society, and not, as with us, by the State department. Indiana's State Agricultural Society has a permanent location with thirty-six acres of ground, costing originally twenty thousand dollars, now estimated at one hundred and fifty thousand dollars, ornamented with appropriate buildings of the best character, the main hall being of brick on a stone foundation, covered with a fire-proof roof, and three hundred feet in length. It has likewise permanent steam power, with one thousand feet of shafting. During the year improvements valued at sixteen thousand dollars have been made, and paid for from the receipts of the fair. The whole property is said to be worth three hundred and thirty thousand dollars, and each year shows the wisdom of fixed quarters. A late president of the Board of Agriculture of Nebraska writes me that since the permanent location of the State Agricultural Society in Omaha it had become a marked success, rapidly increasing in interest and attendance, and under no circumstance would they resort again to the migratory plan. The executive committee of the State Agricultural Society of Pennsylvania has recently appointed a committee of five persons to ascertain if a permanent location cannot be secured in the vicinity of Philadelphia, expressing the conviction that the magnitude of the interests involved forbids the continuance of the migratory plan. It may be that two or three different points in this State would make such overtures as would warrant consideration. I feel sure that Detroit would act liberally with you in the solution of this important subject, which must, sooner or later, command your best practical judgment and action in the interest of economy and future prosperity.

No man who has considered the subject in all its varied bearings in the city of Detroit, has failed to see that the presence of a great fair has brought with its 75,000 to 100,000 strangers, rich commercial benefits, to say nothing of incidental advantages and the formation of personal acquaintances and friendships. It seems most desirable to me that Detroit should make such proposals to you as would be acceptable and lead to the establishment of permanent and improved facilities for your future accommodation. My own judgment has favored three locations with permanent buildings and improved grounds, widely apart yet wisely selected, with a view to the future growth of Michigan and the conceded superiority of the State Society over district institutions. In either case whether a permanent or alternating series of locations, I should strongly recommend the purchase and ownership of grounds by the State Agricultural Society.

The often mooted question of universal competition was fully settled at the last fair; open to the competition of the world should be our motto, and to secure the presence of the best specimens of domestic animals of every character from distant points, larger premiums should be offered, thereby stimulating to the highest excellence attainable by our own citizens. If it is practicable to reduce the expenses of the exhibition by rejecting animals that do not reach a high standard of excellence, and so add to premiums on the better class, I should deem it well worthy of your consideration. It cannot be denied that in mechanical contrivances and machinery, as well as animals, there is coming to our fairs much that might as well be left at home. The experiences of the late meeting will doubtless indicate the need of some changes in the premium list, especially with reference to draught horses, which were a prominent and interesting feature of the last fair. The committee having this in charge will undoubtedly remove all cause for complaint hereafter. I am, however, inclined to submit whether it will not be wise to discontinue on domestic animals a fourth premium. In the earlier days of the Society there might have existed some excuse for offering it, but in view of the vast increase in value and number of animals of high character, that necessity has entirely disappeared. Many of the most successful associations in the country offer no third premium; notably St. Louis and the State Societies of Iowa and Illinois; yet, with only a first and second premium, they find no lack of animals on exhibition of the best type in the various breeds. I believe the fourth premium has a tendency to cheapen and degrade rather than elevate the standard of excellence, and I would therefore respectfully recommend its discontinuance hereafter, on everything offered for exhibition at our annual fair. It appears desirable that your periodical visits to the Agricultural College should be continued. This institution was an outcome of your Society, and mainly through its influence was secured to the farmers of Michigan. Its history, from the date of its origin to the present moment, shows that no mistake was made when the Legislature appropriated the required funds for its existence. It is to our credit as a State, also, that it was in the thoughts and hearts of the people, and a fixed fact, before the national government made appropriations that secured such institutions for all the States. Our own Agricultural College stands preëminently first, and its practical teachings and beneficent influence are effecting a radical improvement in the intellectual character, daily lives, and tastes of that great class of our community for whom it was specially established. The farmers' institutes held in different sections of the State, though too few in number, have stimulated thought, created a higher ambition, and a more appreciative sense of the character and dignity of agricultural life and occupation. But the near future is still more to vindicate the wisdom of securing this institution for the farmer. The influence of fifty per cent of the students graduated, returning with new tastes, matured thought, cultivated intellects, men of wisdom and practical judgment, to the farm, cannot be over-estimated. It will be the leaven which is to lift the farmers of Michigan upon a higher plane, and furnish men who are to properly represent their interests in the legislative and congressional halls, as also to secure a more intelligent and economical cultivation of the soil. But there is yet an incompleteness in this institution. The mechanical department is still wanting. A liberal appropriation, securing this, will greatly augment its power for good to a much larger and different class of students. I submit whether some action on your part may not hasten a movement of the Legislature in this behalf.

The exhibit of the horticultural society at the last fair exceeded all expectations, and could only have been secured by the greatest energy on the part of the officers of that institution. The volume of the display, as well as the exceptionally fine character of it, were most creditable, and elicited universal commendation. In view of the almost total destruction of fruit in the State of Michigan, it was certainly a matter of surprise to all that this department was so admirably sustained. That society deserves your best consideration, and I would recommend a continuance of the appropriation, both for premiums and expenses, as heretofore, under the same restrictions. We could not well spare so attractive and valuable an adjunct to our annual display.

Our sixth rule says no spirituous or intoxicating liquors shall be allowed to be sold on the fair grounds during the fair. I know very well that it has been the intention and determination of every member of the executive committee to see this rule rigidly enforced; but in the hurry and pressure of other engagements, there has grown up, without much notice, a disregard of this wise rule of the society, for spirituous liquors have been sold more or less at the State fair during the last four or five years, with some effort at concealment, however, until last fall. At the late fair spirituous liquors were exposed to the public eye and sold to all who called for

them. It is a serious question whether permission to sell lager beer can be granted without carrying all liquors that will intoxicate. The great mass of persons who get the right to sell beer on the State fair grounds will covertly sell other spirits. Is it not wise, therefore, for us to clear our skirts entirely, thus removing, as far as we are concerned, all temptation from the youth who visit our fairs and whose morals we are bound to protect so far as is in our power? I believe the sentiment of the State strongly demands its entire exclusion, and that sentiment we are bound to respect. The State Agricultural Society of Indiana prohibited the sale of liquors, including beer, five years ago, and has suffered no diminution in interest or prosperity on that account. Nebraska has never allowed the sale of ardent spirits or beer on county or State fair grounds, yet the fair at Omaha last fall was the most prosperous ever held in the State. Iowa excluded from the fair grounds all liquors five years ago, and although the present direction, as the president of that society writes me, is very liberal, a vote could not be secured for the sale of lager beer. It seems to me clear, gentlemen, that the time has arrived for decisive action on this subject; I would therefore recommend that beer, ale, wine, and all other intoxicating liquors, with all side shows and amusements, that offend good taste, impair the dignity or compromise the high character of the society, be forever excluded from or about the fair grounds. I am firmly of the opinion that we shall gain in other directions what we may lose by booth rents for the sale of intoxicants or exhibitions of questionable character.

The matter of crop reports is exciting much interest in our own and other States; they were authorized for Michigan by the Legislature of 1881, and the clerical work has been done by the State department, the duties occupying the time of one clerk only as now conducted. There exists a conviction that these reports, enlarged and amplified, may be made not only desirable, but extremely valuable to the farming community under a somewhat different management. In Ohio, Pennsylvania, and New York these reports are under the direction of the State Agricultural Societies and the Boards of Agriculture (where they would seem naturally to belong). In view of the intimate relations sustained by this society to the different sections of the State, I would suggest whether it may not be proper and desirable to ask the Legislature to transfer this work to the Michigan State Agricultural society, acting independently or in connection with the Agricultural College Board, having a competent scientific person who shall be charged with the responsibility of these reports and their distribution, being recognized at the same time as corresponding secretary of the Michigan State Agricultural society, with a salary paid by the State, for whose benefit the work is performed.

In dairy products, for some cause, Michigan occupies an inferior rank; it is difficult to understand the reason; it certainly is not found in an unsuitable soil, for in every section of the State nutritious grasses are produced. Illinois, Wisconsin, and Iowa are in advance of us in milk products, and they have a first-class reputation in eastern markets, while ours are comparatively unknown. One dairyman in Northern Illinois milks 600 cows, and his butter commands a ready sale in Chicago at forty (40) cents. Much of the butter of Wisconsin, I am informed, is equally fine, and there is in that State a thrifty dairy interest that has worked up this industry with most profitable results. I should say intelligent, energetic efforts will secure to Michigan similar success, for our soils are well adapted to milk products. Nothing requires more care, yet nothing pays better for care than wise practical management of dairy farming. For more than thirty years there has been in our Detroit market reports but one "*refrain*," markets bare of good choice butter which would command a high price, inferior qualities and grease butter in great quantities and without demand. The estimated cost to the farmer in Pennsylvania of butter is twenty (20) cents and the average price realized is 25 cents for the State, giving a gross return enormous in amount. The dairy products of Michigan, with her 317,000 cows, should yield at least \$12,000,000—while shrewd dealers do not believe we get \$5,000,000. Special prizes in neighboring States are given for creamery butter, and that class of butter in all markets, seems to have the preference; would it not be wise to encourage the establishment of creameries throughout the State by special premiums as the true way out of the dilemma in which we seem to be placed? Experience shows little success in reducing the expenses of our annual fairs, which seem enormous. The cost of forage ought to be materially lessened, and if a reduction cannot be effected otherwise, a change should be made for it, as in many other States (it is for the interest of the exhibitor to economize expenses, as thereby premiums may be enlarged). I am slow to believe that there is any just requirement for \$1,600 worth of hay and straw. It strikes me a saving may be effected in this item, if not in others.

Leading farmers are of the opinion that the time has come for an experimental station in Michigan—many believe it should be at the charge of the general government. While it may be desirable to shift the cost, each State should control its own station, and it should be located in Michigan at the Agricultural College farm, under the control of the faculty of that institution. The necessity and advantages of such stations are too apparent to require a recital.

The same arrangement, with reference to the fair circuit, prevailed in 1883, which proved so pleasant and satisfactory the previous year. At a meeting held in Detroit, December 12th last, this society being fully represented with five other associations, it was unanimously resolved to continue the plan, if agreeable to you, of holding the fair for Michigan September 15th to the 20th inclusive. The meeting of the fair circuit committee was interesting and valuable in suggestions which will be brought to your notice by the secretary.

The financial condition of your society was never more satisfactory, the balance in the hands of the treasurer being \$26,134.54. But for the extraordinary expenses last fall, and unfavorable weather the most important day of the fair, your balance could not have been much less than \$35,000. It is agreeable to know, however, that a fund is accumulating from which drafts for permanent improvements, if thought advisable, can be made. The management of your finances continues entirely satisfactory. The treasurer, Mr. Dean, has earned your warmest thanks for his intelligence, fidelity, and thoroughness in the discharge of his official duties, and the courtesy and ability of your secretary are also entitled to hearty recognition. The business and other committees have been untiring in their devotion to all interests involved in the line of their duties. Through your efforts, gentlemen, the society never occupied a higher position, or was more entitled to the confidence of the public, than at this date of its history. Your energy and practical judgment have greatly aided in the development of the resources of this great State. The consciousness of work well done, with the fruits of success everywhere apparent, is your ample reward. I trust this annual meeting may be harmonious, profitable, and productive of future prosperity.

President Fralick resumed the chair.

The secretary's report was then read as follows:

SECRETARY'S REPORT.

To the Honorable President and Executive Committee:

GENTLEMEN—I have the honor herewith to submit the detailed annual report of the transactions of the Michigan State Agricultural Society for the year 1883.

Three hundred and sixty-one orders, amounting to \$24,967.99, were drawn upon the treasurer for the payment of accounts audited by the business committee, signed by the secretary, and countersigned by the chairman of the business committee. The detail of the general expenditures for which the above orders were issued has been classified and arranged under the proper heads, and will be found in the report of the business committee; a record of the same will be found in the secretary's register of accounts for 1883, and upon the stubs of the orders. Vouchers corresponding with the orders are on file in the secretary's office.

Three hundred and ninety-four checks, amounting to \$9,916.98, were issued for the payment of premiums awarded at the annual fair; \$90 of this amount was awarded to cattle exhibited by the State Agricultural College and subsequently donated to the society, leaving a balance of premiums to be paid by the treasurer of \$9,826.98. A full and detailed statement, showing number of checks, amount, and to whom issued, will be found in the accompanying schedule.

The following table exhibits the amount of money premiums offered and awarded in each division; also a statement of diplomas and medals offered and awarded:

CASH PREMIUMS.

DIVISION.	Offered.	Awarded.
A—Cattle.....	\$4,317 00	\$3,402 00
B—Horses.....	3,572 00	2,696 00
C—Sheep.....	1,416 00	1,314 00
D—Swine.....	701 00	586 00
E—Poultry.....	360 00	289 00
F—Farm and Garden Products.....	676 00	216 00
G—Dairy Products.....	274 00	226 00
H—Bees, Honey, etc.....	188 00	201 98
I—Farm Implements.....		
J—Vehicles.....		
K—Machinery.....		
L—Manufactured Goods.....	450 00	250 00
M—Musical, Surgical Instruments, etc.....	23 00	
N—Art Department.....	560 00	400 00
O—Needlework.....	346 00	264 50
P—Miscellaneous.....	110 00	63 00
Q—Children's Department.....	50 00	8 50
	\$13,033 00	\$9,916 98
Horticultural Department (under the auspices of the State Horticultural Society).....	1,448 25	785 75
Total.....	\$14,181 25	\$10,702 73

DIPLOMAS AND MEDALS.

DIVISION.	DIPLOMAS.		MEDALS.	
	Offered.	Awarded.	Offered.	Awarded.
D—Swine.....	5	4		
J—Vehicles.....	2	2		
L—Manufactured Goods.....	1	2	1	3
M—Musical and Surgical Instruments.....	7			
N—Art Department.....	1			
O—Needle Work.....	2	1		
P—Miscellaneous.....			1	
Total.....	18	9	2	3

The following is a list of entries in each class and division:

Class.	DIVISION A—CATTLE.	
1—Shorthorns.....		266
2—Devons.....		59
3—Herefords.....		60
4—Ayrshires.....		25
5—Jerseys.....		90
6—Galloways and Polled Angus.....		20
7—Holsteins and Dutch Friesians.....		120
8—Grade Cattle.....		75
9—Working Oxen and Steers.....		19
10—Fat Cattle.....		29
N. E. Guernseys.....		5
Total.....		759

DIVISION B—HORSES.

Class.	
11—Thoroughbreds.....	1
12—Horses of all Work.....	88
13—Roadsters.....	60
14—Breeder's Stock.....	32
15—Gents' Driving Horses to Road Wagon.....	15
16—Draught Horses.....	99
17—Carriage and Buggy Horses, Mares, or Geldings.....	50
18—Michigan Roadster and Thoroughbred Stallions.....	33
19—Michigan Roadster and Thoroughbred Mares and Geldings.....	39
19½—Michigan Thoroughbred Stallions, Mares, and Geldings.....	6
20—Stallions with six of their own get.....	5
Total.....	428

DIVISION C—SHEEP.

21—Thoroughbred American Merinos.....	69
22—Thoroughbred American Merinos bred and owned in Michigan.....	88
23—Fine Wool Grades.....	15
24—Southdowns.....	40
25—All Middle Wool Sheep other than Southdowns.....	92
26—Leicesters.....	24
27—Cotswold and other Long Woolled Sheep.....	55
28—Grade Coarse Woolled Ewes.....	15
29—Fat Sheep.....	38
Total.....	436

DIVISION D—SWINE.

Class.	
30—Berkshire.....	48
Essex.....	27
Suffolk and Small Yorkshire.....	22
Poland China.....	42
Chester White and Large Yorkshire.....	17
Fat Hogs.....	4
Total.....	160

DIVISION E—POULTRY.

Class.	
31—Poultry.....	430

DIVISION F—FARM AND GARDEN PRODUCTS.

Class.	
32—Grain and Seeds.....	70
33—Roots and Vegetables.....	22
33½—Display of Roots and Vegetables.....	2
34—Flour, Feed, and Meal.....	8
Total.....	102

DIVISION G—DAIRY PRODUCTS.

Class.	
35—Butter, Cheese, and Dairy Articles.....	83
36—Sugar, Bread, and Pickles.....	28
37—Soap, Prepared Groceries, etc.....	16
Total.....	127

DIVISION H—BEES, HONEY, ETC.

Class.	
38—Bees, Honey, etc.....	88

DIVISION I—FARM IMPLEMENTS.

Class.	
39—Plows.....	78
40—Tillage Implements.....	57
41—Seed Drills, Sowers, Planters, etc.....	49
42—Haying and Harvesting Implements.....	141
43—Apparatus for Cleaning and Preparing Crops for Market and for Feeding Stock.....	81
44—Miscellaneous Farm Articles.....	66
Total.....	472

DIVISION J.—VEHICLES.

Class.	
45—Wagons and Carriages.....	187

DIVISION K.—MACHINERY.

Class.	
46—Machinery for working upon Metal.....	75
47—Miscellaneous Machinery.....	—
Total.....	75

DIVISION L.—MANUFACTURED GOODS.

Class.	
48—Materials.....	20
49—Factory Made.....	3
50—Articles of Dress.....	3
51—Articles of Leather and India Rubber.....	117
52—Articles of Furniture.....	76
53—Stoves, Iron and Concrete Work.....	52
Total.....	271

DIVISION M.—MUSICAL AND SURGICAL INSTRUMENTS, ETC.

Class.	
54—Musical Instruments, etc.....	29
55—Jewelry, etc.....	1
Total.....	30

DIVISION N—DEPARTMENT OF ART.

Class.	
56—Painting and Sculpture.....	186
57—Printing and Stationery.....	6
Total.....	192

DIVISION O—NEEDLE WORK.

Class.	
58—Articles of Ladies' Dress.....	17
59—Plain Needle and Machine Work.....	69
60—Embroidery and Ornamental Needle Work.....	191
61—Crochet, Knit, and Fancy Work.....	72
62—Hair, Shell, and Wax Work.....	33
Total.....	382

DIVISION P—MISCELLANEOUS.

Class.	
63—Miscellaneous Articles.....	48
64—Household Articles.....	31
Total.....	79

DIVISION Q—CHILDREN'S DEPARTMENT.

Children's Work..... 13

HORTICULTURAL DEPARTMENT.

Fruits, Flowers, etc..... 600

Total in all Departments.....4,831

Since the last annual meeting, "Articles of Association" have been filed in this office by the following named associations: "Avon Agricultural Society," "Oxford Union Agricultural Society," and the "Marquette County Agricultural Society."

Inventory of property in the secretary's office:

American Shorthorn Herd Book.....	24 vols.	
American Jersey Cattle Club Herd Register.....	9 vols.	
American Devon Herd Book.....	5 vols.	
Dutch Friesian Herd Book.....	2 vols.	
Holstein Herd Book.....	5 vols.	
North American Galloway Herd Book.....	1 vol.	
Pedigrees of English Shorthorn Bulls.....	1 vol.	
American Stud Book.....	3 vols.	
American Berkshire Record.....	4 vols.	
Vermont Merino Sheep Register.....	1 vol.	
Michigan Farmer for years 1845 to 1854, inclusive, bound in.....	8 vols.	
Several Agricultural Reports of Michigan, Ohio, Indiana, Illinois, Iowa, Kansas, Missouri, Massachusetts, Connecticut, New Hampshire, Maine, California, Upper Canada Department of Agriculture, and State Horticultural Society.		
1 Office Desk,	1 Old Trunk,	5 Boxes for Books,
1 Society Seal,	1 Postal Scale,	1 Gold Medal,
6 Ink Stands,	1 Pair Shears,	2 Letter Files,
1 Bill File,	20 Spindles.	

J. C. STERLING,

Secretary.

Treasurer Dean then read the annual report, which was as follows:

TREASURER'S REPORT.

FAIR HELD AT DETROIT, SEPTEMBER, 1883.

Jan., 1883. Cash on hand at settlement..... \$23,227 85.

RECEIPTS DURING THE CURRENT YEAR.

From Philo Parsons (Detroit subscription).....	5,000 00
From W. H. Cobb, chairman, on account of booth and ground rents.....	\$4,032 25
From Detroit subscription.....	250 00
From check room.....	39 67
From sheep and hog pens sold.....	50 00
From rebate on freight bills.....	17 87
From table cutlery sold.....	5 47
From sale of lumber.....	3,000 00
	<hr/>
	\$7,395 26
From membership certificates.....	971 00
From J. M. Sterling.....	70 00
From President Fralick.....	50
From gate admissions.....	24,591 15
From interest account.....	400 00
	<hr/>
Total.....	\$61,655 76

DISBURSEMENTS.

June, 1883.	Paid business orders, 1883.....	\$24,967 99
	Paid premium checks, 1883.....	9,729 48
	Paid Horticultural premium checks.....	785 75
	Paid premium checks, 1882.....	38 00
	Cash balance on hand.....	26,134 54
	Total.....	\$61,655 76

Of the above balance there is invested, in the name of the society, \$10,000, face value, in four per cent registered United States bonds.

A. J. DEAN,
Treasurer.

Detroit, January, 1884.

On motion, accepted and referred to finance committee.

W. H. Cobb, chairman of the business committee, reported as follows:

STATEMENT OF BUSINESS COMMITTEE IN DETAIL.

EXPENSES OF WINTER MEETING.

1883. Order No.		
Jan. 12.	4 I. H. Butterfield, Jr., expenses.....	\$3 50
	5 A. O. Hyde, expenses.....	3 75
	6 F. L. Reed, ".....	5 05
	7 Wm. Ball, ".....	4 90
	8 H. O. Hanford, ".....	2 75
	9 F. V. Smith, ".....	5 80
	10 C. A. Harrison, ".....	5 00
	11 John Lessiter, ".....	1 40
	12 J. Q. A. Burrington, expenses.....	6 60
	13 J. L. Mitchell, expenses.....	2 30
	14 A. Angel, ".....	7 35
	15 A. F. Wood, ".....	3 25
	16 Wm. Chamberlain, ".....	7 85
	17 E. W. Rising, ".....	6 00
	18 C. W. Green, ".....	1 60
	19 A. J. Dean, ".....	15 00
	20 J. M. Sterling, ".....	8 95
	21 Henry Fralick, ".....	4 75
	22 M. P. Anderson, ".....	3 55
	23 W. J. Baxter, ".....	6 55
	24 Messenger Boy, ".....	1 25
	25 E. O. Humphrey, ".....	5 20
	26 W. H. Cobb, ".....	11 05
	27 Michigan Exchange Board committee.....	226 50
22.	28 U. S. Express Co., express on books and papers.....	3 50
	29 Detroit Free Press, printing proceedings winter meeting.....	132 75
15.	30 J. C. Sterling, personal expenses winter meeting.....	4 40
22.	32 Postmaster, Monroe, stamps for reports winter meeting.....	6 50
12.	34 F. W. Myer, stationery for winter meeting.....	4 53
	36 D. W. Howard, personal expenses.....	12 40
	Total.....	\$513 98

PRESIDENT'S OFFICE.

Sept, 22.	141 S. H. Ostrander, door-keeper.....	7 50
26.	234 Henry Fralick, expenses of Prest. and Clerk.....	75 85
	Total.....	\$83 35

SECRETARY'S OFFICE.

1883. Order No.		
Jan. 12.	31 J. C. Sterling, one-quarter salary as Secretary.....	\$250 00
June 1.	67 J. C. Sterling, first qr. salary for 1883.....	250 00
	104 J. C. Sterling, second qr. salary for 1883.....	250 00
Sept. 22.	145 J. H. Green, ass't sec'y.....	14 00
	146 W. H. Horton, ".....	18 00
	147 H. W. Baird, ".....	14 00
	148 Geo. C. Wilcox, ".....	16 00
	149 Chas. J. Phillips, ".....	27 55
	150 C. M. Weed, ".....	10 00
26.	189 Mrs. Wm. Bickford, board clerks.....	38 00
	190 Russell House, board cl'ks.....	67 50
	205 Mrs. C. M. Spencer, ".....	27 00
Oct. 10.	306 A. E. Cook, ass't sec'y.....	24 00
	307 O. Johnson, ".....	8 00
	308 J. E. Landon, ".....	30 00
	309 J. C. Hanford, ".....	23 00
	310 F. J. Phillips, ".....	19 50
	311 J. C. Sterling, three months salary as Secretary.....	250 00
Dec. 3.	340 J. M. Sterling, rent of office one year.....	50 00
	Total.....	\$1,386 55

TREASURER'S OFFICE.

Sept. 26.	203 Russell House, board cl'ks.....	57 50
	226 J. H. Morris, baggage wagon during fair.....	12 00
	266 Mrs. Spencer, board clerks.....	24 00
	267 Mrs. Gentling, ".....	4 50
	288 Treasurer's clerk hire.....	161 50
Nov. 12.	336 A. J. Dean, book-keeper.....	400 00
	Total.....	\$659 50

GENERAL EXPENSES.

Jan. 12.	1 M. L. Sheets, insurance....	\$10 00
March 8.	52 Mich. Mnfg. Co., for board horses in 1882.....	1 00
June 13.	95 W. H. Cobb, sundry expenses, 104 J. Gilbert, storage on traps.....	10 30
	105 J. Gilbert, labor loading and unloading cars.....	30 00
Aug. 4.	115 J. C. Sterling, various trips to Detroit and Jackson.....	8 00
	139 J. M. Sterling, sundry expenses and trips to Detroit.....	11 02
	Total.....	11 10

1883. Order No.	
Sept. 22. 142 Build'g inspector for grand stand in Detroit.....	\$6 00
26. 191 J. M. Sterling, several trips to Detroit.....	8 45
196 W. H. Heywood, clerk of election.....	1 50
199 O. Johnson, clerk of election.....	2 00
200 J. E. Landon, 5 plats of hall	5 00
202 Mich. Gas Light Co., lighting grounds during fair.....	23 50
212 Gorton, Blewett, & Co., memorandum books.....	6 88
222 A. J. Dean, sundry trips to Detroit and telegraphing.....	41 40
Sept. 26. 232 A. J. Dean, R. R. ticket to Louisville and return.....	\$22 50
278 A. Wheeler, inspector of election.....	3 00
Nov. 12. 332 F. W. Muir, stationery.....	12 26
Dec. 3. 342 Wm. Bickford, labor building fence and loading traps.....	57 38
Nov. 1. 326 Detroit Water Works for water.....	15 00
Dec. 13. 344 Wm. Beaman, unloading traps.....	9 50
345 John Hastings, cartage on traps.....	8 00
350 J. C. Sterling, tel., stationery, attending meeting, etc.....	25 20
351 A. J. Dean, treas. E. R. expenses, etc.....	31 50
353 Geo. F. Payne, record book.....	9 00
358 J. Huff Jones, fence front, Swift's lot.....	30 00
	<hr/> \$399 49

MEDALS AND DIPLOMAS.

Jan. 12. 3 M. S. Smith & Co., Det., for medals and diplomas.....	\$3 75
Nov. 1. 318 U. S. Mint, 3 silver medals.....	12 25
Dec. 13. 346 Smith & Mayhew, filling diplomas, medals, etc.....	6 70
	<hr/> \$25 70

PRINTING AND ADVERTISING.

Jan. 1. 68 G. F. Payne, of Adrian, printing blank books.....	\$58 30
69 Jno. Farley, Toledo, Circuit Posters.....	18 75
100 F. D. Hamilton, of Monroe, per list, Letter heads.....	233 50
102 Democrat Print. Co., Monroe, Envelopes, Bill, Letter heads.....	32 85
Aug. 4. 125 Times Expositor, Adrian, Letter heads, etc.....	57 50
131 Richmond & Backus, one Lease book.....	6 00
136 Calvert Lithograph Co., printing Compliment'y tickets.....	29 40
Sep. 26. 184 Post & Tribune, printing Posters.....	75 50
219 Gulley, Bornman & Co., printing tickets.....	1 25
227 Gulley, Bornman & Co., Dairy Dept.....	3 25
228 Free Press, Posters, Programmes, etc.....	166 75
232 A. J. Dean, expenses of Chairman.....	5 95
252 Times & Expositor, Premium cards.....	20 50
256 O. S. Gulley, Bornman & Co., printing tickets.....	99 57
Oct. 16. 313 A. E. Cook, folding and mailing posters, etc.....	21 00
314 J. C. Sterling, several trips to Detroit.....	10 05
315 F. D. Hamilton, printing Letter heads, Bill heads and Envelopes.....	24 70

1883. Order No.	
Oct. 16. 316 Democrat Print. Co., Monroe, Tags, Circulars, etc.....	\$29 65
Nov. 1. 321 Evening News, adv. booth renting.....	5 04
323 Times & Expositor, adv. booth renting.....	3 00
12. 335 Johnson & Gibbons, publishing awards.....	75 00
1883. Order No.	
Nov. 12. 337 O. S. Gulley & Co., 14,000 School Certificates.....	9 80
	<hr/> \$987 31

POSTAGE.

Feb. 6. 33 Kalamazoo postmaster, stamps, Business Com.....	\$5 00
35 Monroe postmaster, postage for Secretary.....	10 00
101 Kalamazoo postmaster, postage, Business Com.....	2 00
July 20. 108 Detroit postmaster, postage for Compl'y tickets.....	18 00
109 Detroit postmaster, postage for Premium list.....	15 00
Aug. 4. 126 Adrian postmaster, postage for Premium Com.....	5 00
Sept. 22. 151 Detroit postmaster, postage for posters.....	5 00
152 Detroit postmaster, postage for Secretary.....	15 00
153 Detroit postmaster, postage for posters.....	12 00
154 Detroit postmaster, postage for Premium list.....	11 00
Oct. 16. 312 Detroit postmaster, postage for Premium checks.....	8 00
Dec. 6. 341 Detroit postmaster, postage for Secretary's office.....	6 00
13. 352 J. H. Facee, stamps for Treasurer's office.....	11 20
	<hr/> \$123 20

LOCATING COMMITTEE.

March 1. 38 Kalamazoo House board bill.....	\$11 00
Jan. 2. 2 Jno. Gilbert at Kalamazoo personal expense.....	8 70
March 8. 40 W. H. Cobb, expense at Detroit.....	5 80
41 A. O. Hyde, expense at Detroit.....	6 60
42 Wm. Ball, expense at Detroit.....	5 00
43 H. Fralick, expense at Detroit.....	8 25
44 W. J. Baxter, expense at Detroit.....	2 95
45 Russell House board committee.....	6 70
46 A. J. Dean, personal expenses.....	11 40
48 J. C. Sterling, personal expenses.....	8 40
49 J. H. Morris, for Livery.....	2 00
50 J. M. Sterling, personal expenses.....	8 65
51 Russell House, Detroit, board committee.....	31 30
9. 53 E. O. Humphrey, personal expenses.....	4 85
15. 54 W. H. Cobb, personal expenses.....	5 35
55 A. O. Hyde, personal expenses.....	3 75
56 A. J. Dean, personal expenses.....	4 10
57 Wm. Ball, personal expenses.....	3 30
22. 58 Henry Fralick, personal expenses.....	9 50
59 W. H. Cobb, personal expenses.....	5 59
60 F. V. Smith, personal expenses.....	8 00

1883. Order No.

M'ch 22. 61 W. J. Baxter, personal expenses.....	\$2 80
62 A. J. Dean, personal expenses.....	4 30
63 A. O. Hyde, personal expenses.....	3 75
64 Russell House, Detroit, board committee.....	27 45
65 J. M. Sterling, personal expenses.....	2 50
66 Russell House, Detroit board.....	20 15
Total.....	\$222 19

METROPOLITAN POLICE.

Sept. 26. 254 Metropolitan Police Telephone.....	\$25 00
255 Metropolitan Police, for horses for police.....	72 00
Total.....	\$97 00

EXPRESS.

Aug. 4. 114 U. S. Express Co., sundry charges.....	\$17 05
Dec. 31. 348 U. S. Express Co., sundry charges.....	19 70
Total.....	\$36 75

LANSING MEETING.

June 13. 79 Philo Parsons, personal expenses.....	\$5 00
80 I. H. Butterfield, personal expenses.....	9 45
81 M. P. Anderson, personal expenses.....	4 35
82 Wm. Chamberlain, personal expenses.....	7 55
73 C. A. Harrison, personal expenses.....	4 05
84 F. L. Reed, personal expenses.....	2 10
85 Wm. Ball, personal expenses.....	4 90
86 A. O. Hyde, personal expenses.....	3 05
87 J. L. Mitchell, personal expenses.....	1 10
88 J. Q. A. Burrington, personal expenses.....	6 50
89 John Lessiter, personal expenses.....	8 00
90 D. W. Howard, personal expenses.....	10 35
91 A. F. Wood, personal expenses.....	70
92 H. O. Hanford, personal expenses.....	4 75
93 J. M. Sterling, personal expenses.....	7 70
94 Hudson House, board Committee.....	56 75
Aug. 4. 113 J. C. Sterling, personal expenses.....	5 75
Sept. 26. 230 A. J. Dean, expenses of Treasurer.....	6 75
262 E. M. Rising, personal expenses.....	7 50
Total.....	\$156 30

BUSINESS COMMITTEE.

June 1. 70 W. H. Cobb, expenses for Committee.....	\$17 75
2. 76 A. O. Hyde, personal expenses.....	7 50
June 2. 77 F. V. Smith, personal expenses.....	6 95
78 Russell House, Detroit, Board Committee.....	21 75

1883. Order No.

Aug. 4. 119 F. V. Smith, personal expenses.....	\$6 50
120 W. H. Cobb, personal expenses.....	8 27
121 A. O. Hyde, personal expenses.....	7 75
Sept. 26. 177 A. O. Hyde, expenses to Detroit.....	7 75
207 A. O. Hyde, expenses attending meeting.....	7 75
250 W. H. Cobb, expenses of Chairman.....	14 39
275 W. H. Cobb, expenses of Chairman.....	27 33
Nov. 1. 327 W. H. Cobb, personal expenses.....	9 50
Dec. 13. 343 J. B. Cobb, clerk Business Committee.....	80 00
354 J. B. Cobb, personal expenses.....	5 70
356 A. O. Hyde, personal expenses.....	7 00
357 W. H. Cobb, personal expenses.....	37 45
359 W. H. Cobb, expenses attending meeting of Com.	9 60
Total.....	\$282 94

AGRICULTURAL SOCIETIES.

Feb. 13. 37 Wm. Ball, expenses at Lansing.....	\$10 00
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AGRICULTURAL DEPARTMENT.

Sept. 26. 210 J. L. Mitchell, expenses of Superintendent.....	\$33 00
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FAIR CIRCUIT.

March 1. 39 J. M. Sterling, expenses to Toledo.....	\$2 25
47 A. J. Dean, personal expenses.....	4 05
Dec. 17. 360 J. M. Sterling, attending meeting of Committee.....	2 10
Total.....	\$8 40

MACHINERY DEPARTMENT.

Sept. 26. 213 Wm. Chamberlain, expenses of Supt.....	\$30 43
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HARDWARE.

June 1. 71 Wm. Stoner, for tool building.....	\$1 45
72 Buhl, Sons & Co., nails.....	31 21
Aug. 4. 118 Buhl, Sons & Co., nails, etc.	151 24
132 Buhl, Sons & Co., nails.....	30 87
Sept. 26. 163 Jacob Wily, nails, etc.	116 26
180 Buhl, Sons & Co., nails, butts, hinges, etc.	50 52
204 Buhl, Sons & Co., screws, hinges, and cutlery.....	36 16
Dec. 13. 349 C. Keyser & Co., hardware.....	2 50
Total.....	\$420 21

FREIGHT.

June 98 M. C. R. R., freight on five cars lumber.....	\$88 32
Aug. 4. 116 M. C. R. R., freight on four cars lumber.....	58 76
Aug. 4. 127 M. C. R. R. freight on Jackson lumber.....	\$176 37
127 M. C. R. R. frt. on eighteen cars lumber.....	186 96
133 M. C. R. R., traps from Ypsilanti.....	16 00
Total.....	\$526 41

BUILDING, REPAIRS, AND LABOR ON
GROUNDS.

1883. Order No.		
June 1.	73 Pay roll at Jackson.....	\$57 00
	74 Mich. Cent. R. R. transportation for Beeman.....	25 00
2.	75 Pay roll at Det. for labor.....	85 50
99	Pay roll at Jackson.....	67 50
Aug. 4.	117 Pay roll by Beeman.....	14 55
	122 Pay roll at Detroit for labor in July.....	1,112 12
	124 Pay roll at Det. for labor.....	347 00
	128 Wm. Bickford, board men.....	99 49
	130 Pay roll for June labor on grounds.....	307 12
	134 Pay roll for June labor on grounds.....	339 37
	135 W. M. Beeman, expenses.....	10 50
	138 Ed. Emmons, loading lumber at Jackson.....	82 00
	140 Mich. Cent. R. R. transportation for W. M. Beeman and J. B. Cobb.....	33 60
Sept. 26.	160 Boydell Bros. for glass and paint.....	68 15
	170 Fleming & Crewer, labor.....	3 76
	179 E. B. Koot & Sons, fronts for poultry coops.....	1 50
	181 E. T. Barnum, netting for poultry coops and fronts.....	17 10
	237 Doyle, Hayes & Dunn, pay roll labor on grounds.....	25 50
	239 Pay roll labor on grounds.....	361 00
	242 W. H. Beeman, for glazing.....	44 60
	243 Loomis & Co. for lath.....	3 72
	244 W. H. Beeman, expenses for carpenters.....	5 80
	245 Pay roll labor on grounds.....	566 63
	246 Pay roll labor on grounds.....	198 87
	247 Mrs. Bickford, board men.....	38 30
	251 Pay roll labor on grounds.....	350 25
	260 Pay roll labor on grounds.....	150 63
	262 J. H. O'Brien, labor.....	25 37
	284 Boydell Bros., glass, paint, etc.....	97 88
	296 E. P. Campbell, putting up Standish fence.....	6 00
Nov. 3.	331 J. J. Stevens, plans and estimates for buildings.....	10 00
12.	333 Thos. Dunn, carpenter work.....	8 00
1.	324 Wm. Beeman, labor.....	20 50
1.	328 Mrs. Bickford, board, Beeman, etc.....	23 70
1.	329 Pay roll labor on grounds.....	186 00
Total.....		\$4,784 01

LUMBER.

June 13.	96 C. H. Bradley, Bay City, two car loads lumber.....	\$397 87
	97 C. H. Bradley, Bay City, lumber for police and express room.....	491 24
July 18.	106 A. G. Havens, Bay City, 40,000 No. 3 shingles.....	51 48
	107 E. Y. Williams, Bay City, lumber for buildings.....	1,831 33
10.	110 Morton & Backus, Detroit, lumber for buildings.....	57 38
July 31.	111 E. Y. Williams, Bay City, lumber for buildings.....	319 10
	112 E. Y. Williams, Bay City, lumber for buildings.....	327 47
Aug. 4.	123 Delbridge, Brooks & Fisher, Detroit, lumber for buildings.....	196 93
	137 Morton & Backus, Detroit, lumber for buildings.....	632 53
	224 Morton & Backus, Detroit, lumber for buildings.....	682 16
	249 H. E. Cobb, Bay City, 4,928 ft. at \$12, for buildings.....	59 14
Oct. 4.	303 A. Backus & Son, lumber.....	1,472 50
Total.....		\$6,019 13

INSURANCE.

1883. Order No.		
Nov. 26.	339 C. H. Booth, Kalamazoo, insurance on traps.....	\$11 50

HORSE DEPARTMENT.

Sept. 26.	223 Geo. W. Phillips, expenses of Superintendent.....	\$16 88
	233 F. V. Smith, expenses of Supt. and assistants.....	206 70
Total.....		\$223 58

MISCELLANEOUS DEPARTMENT.

Sept. 26.	214 C. W. Young, expenses of Superintendent.....	\$32 86
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POULTRY DEPARTMENT.

Sept. 22.	143 S. W. Curtis, Judge Poultry Department.....	\$13 10
	26. 292 J. Q. A. Burrington, Superintendent's expenses.....	27 40
Total.....		\$40 50

LADIES' COTTAGE.

Sept. 22.	156 Mrs. S. B. Wakefield, services.....	\$20 00
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BOOTH RENTING.

Sept. 22.	141 W. H. Gilbert, clerk, board, and expenses.....	\$27 17
	26. 248 McCauley Bros., stationery.....	1 27
Nov. 1.	325 W. H. Gilbert, services and expenses.....	112 75
Total.....		\$141 19

ART DEPARTMENT.

Sept. 26.	162 A. J. Brow, frt., insurance on pictures.....	\$196 44
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BILL POSTING.

Sept. 22.	155 Geo. W. Bowlsby, posting bills at Monroe.....	\$2 00
	26. 206 John Bean, posting Albion and Homer.....	2 25
	217 Chas. VanOstrander, posting Adrian.....	1 13
Dec. 13.	347 Eldred and others, posting Bay City, Battle Creek, Owosso, Pontiac, and Pt. Huron.....	12 16
Total.....		\$17 54

CHECK ROOM.

Sept. 26.	164 Walter Slater, attending baggage.....	\$7 50
	169 Carlos M. Cobb, attending baggage.....	7 50
	176 C. M. Cobb, expenses of clerk.....	5 80
	178 Walter Slater, expenses of clerk.....	5 80
Total.....		\$26 60

PRESIDENT'S LUNCH ROOM.

Sept. 22.	157 A. Strong, milk.....	\$1 50
	159 Wm. Wells, five and a half days' labor.....	8 25
	26. 168 J. F. Buhl, bread, etc.....	1 45
	174 Hull Bros., provisions.....	119 12
	193 Mrs. Kelley, labor.....	11 55
	194 R. W. King & Son, use of crockery.....	5 12
	215 Pay roll, help in lunch room.....	51 00
	276 W. H. Cobb, butter.....	11 80
Total.....		\$209 79

DECORATING.

1883. Order No.	
Sept. 22. 158 Wm. Kelley, 6 days' labor...	\$9 00
26. 238 W. H. McKewen, paneling, etc.....	31 50
302 Newcomb, Endicott & Co., netting.....	28 84
Total	\$69 34

HORTICULTURAL SOCIETY.

Sept. 26. 161 To Horticultural Appropriation.....	\$1,400 00
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POLICE.

Sept. 26. 165 Jno. Winnan, 4 days' labor	\$6 00
171 Nauman & Co., feed for horses.....	3 80
188 Mrs. Bickford, boarding policemen.....	29 50
195 Police pay roll.....	156 00
Total	\$195 30

MEAL TICKETS.

Sept. 26. 166 Michaels & Hackens, meal tickets.....	\$2 10
183 Thos. Swan, 113 tickets.....	37 66
197 Mrs. Wm. Bickford, meal tickets.....	3 50
235 W. H. Cobb, 617 tickets.....	205 67
Oct. 4. 305 W. H. Cobb, 4 tickets.....	1 33
Nov. 1. 320 Owens & Gorman, 33 tickets.....	11 00
Total	\$261 26

NEEDLE WORK DEPARTMENT.

Sept. 26. 167 Mr. Parks, clerk for Supt.	\$12 50
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POWER.

Sept. 26. 216 E. M. Birdsell & Co., engine for field shafting.....	\$32 00
240 W. S. Penfield, engine for field shafting.....	58 00
281 Christie & DeGraff, power for machinery hall.....	411 51
Total	\$501 51

FORAGE.

Sept. 26. 172 Naramore & Co., feed for horses.....	\$3 00
173 Naramore & Co., feed for horses.....	2 45
208 Supt. of forage, for hay and straw.....	396 04
209 G. E. Southworth, straw.....	51 16
270 E. W. Rising, expenses.....	13 50
271 E. W. Rising, team labor.....	64 00
272 E. W. Rising, expenses of superintendent.....	25 80
273 T. J. Wells, hay.....	66 00
Oct. 4. 304 Geo. Beehan, hay and straw.....	1,084 50
Total	\$1,706 45

HOTELS AND BOARD.

Sept. 26. 185 Mrs. Wm. Bickford, board help.....	\$8 50
186 Mrs. Wm. Bickford, board help.....	6 25
187 Mrs. Wm. Bickford, Executive Committee.....	14 00
Nov. 1. 330 Russell House, Detroit, board committee.....	133 50
Dec. 17. 361 Russell House, Detroit, board com. and fair circuit delegates.....	35 75
Total	\$198 00

DAIRY DEPARTMENT.

1883. Order No.	
Sept. 26. 287 F. L. Reed, expenses of superintendent.....	\$5 25
293 F. L. Reed, expenses of superintendent.....	27 50
Total	\$32 95

BICYCLE RACE.

Sept. 26. 201 W. H. Harris & Co., medals for winners.....	\$100 00
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RIBBONS AND BADGES.

Sept. 26. 211 Metcalf Bros., for ribbons	\$54 32
241 E. B. Pennock, safety pins	50
282 Metcalf Bros., ribbons.....	2 17
Total	\$56 99

GATES AND GATEKEEPERS.

Sept. 26. 192 Mrs. Bickford, board men	\$8 00
253 Russell House, board of men.....	3 00
257 Mrs. Gehling, board of men	22 50
265 Mrs. Spencer, ".....	12 00
268 England, ".....	29 00
294 Wm. Ball, superintendent's expenses.....	23 73
295 Pay roll of gate keepers...	178 80
Total	\$277 03

MUSIC DEPARTMENT.

Sept. 26. 218 Detroit band.....	\$140 00
259 W. P. Anderson, expenses of superintendent.....	32 23
Total	\$172 23

LIVERY.

Sept. 26. 175 J. Morris, livery for Business Committee.....	\$6 00
182 J. H. Morris, livery for Business Committee.....	25 00
Total	\$31 00

TRANSPORTATION.

Sept. 26. 198 J. M. Sterling, expenses of chairman.....	\$13 85
Nov. 26. 338 Mich. Cent. R. R., on traps to Kalamazoo.....	22 80
Total	\$36 65

BEE AND HONEY DEPARTMENT.

Sept. 26. 220 W. J. Baxter, assistant superintendent.....	\$16 00
236 W. J. Baxter, Superintendent, expenses.....	11 25
279 W. J. Baxter, expenses of judge.....	3 75
Total	\$31 00

MANUFACTURERS' DEPARTMENT.

Sept. 26. 221 A. F. Wood, expenses of Superintendent and assistant.....	\$39 50
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MARSHAL'S DEPARTMENT.

Sept. 26. 225 A. O. Hyde, expenses of Marshal.....	\$30 25
263 A. O. Hyde, expenses of assistants.....	160 90
Total	\$191 15

MILITARY DRILL.

Sept. 26. 229 J. H. Morris, carriage for judges.....	\$7 00
298 Detroit City Greys, first prize.....	400 00

1883. Order No.	
Sept. 26. 299 Jackson Guards, second prize.....	\$200 00
300 Detroit Light Guards, third prize.....	100 00
301 Company G. First Regiment special prize.....	100 00
Total.....	\$807 00

SHEEP DEPARTMENT.

Sept. 26. 258 D. W. Howard, Superintendent, expenses.....	\$36 65
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RENT OF GROUNDS.

Sept. 26. 261 J. Huff Jones, rent fair grounds 1 year.....	\$400 00
274 J. D. Standish, rent 11 lots on fair ground.....	100 00
297 Col. Swift, rent lots on fair ground.....	50 00
Total.....	\$550 00

IMPLEMENT DEPARTMENT.

Sept. 26. 264 H. O. Hanford, expenses of Superintendent.....	\$34 30
289 Abel Angel, expenses of Superintendent.....	10 75
Total.....	\$45 05

CATTLE DEPARTMENT.

Sept. 26. 269 I. H. Butterfield, Superintendent's expenses.....	\$34 45
283 Wm. Stocking, judge cattle.....	34 25
285 R. Baker, judge cattle.....	17 80
286 V. Barber, ".....	26 10
Nov. 1. 319 Richard Gibson, judge's expenses.....	15 00
322 W. J. G. Dean, judge's expenses.....	7 00
Total.....	\$134 60

CARRIAGE DEPARTMENT.

Sept. 26. 277 John Gilbert, expenses of Superintendent.....	\$14 15
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RECEPTION COMMITTEE.

Sept. 26. 290 Gov. Begole, expenses.....	\$12 00
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SWINE DEPARTMENT.

Sept. 26. 291 John Lessiter, expenses of Superintendent.....	\$18 25
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SWITCHING.

Oct. 25. 317 Mich. Cen. R. R., switching 115 cars from foreign roads at \$2.50 per car.....	\$287 50
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WATER.

Nov. 12. 334 Jas. Flower, float valves, etc.....	\$8 43
355 Wormer & Flowers, fitting and pipe.....	5 55
Total.....	\$13 98

SUMMARY STATEMENT—1883.

Expenses winter meeting.....	\$513 98
President's office.....	83 35
Secretary's office.....	1,386 55
Treasurer's office.....	659 50
General expenses.....	399 49
Medals and diplomas.....	25 70
Printing and advertising.....	987 31
Postage.....	123 20
Locating Committee.....	222 19
Metropolitan Police.....	97 00
Express.....	36 75
Lansing meeting.....	156 30

Business Committee.....	\$282 94
Agricultural societies.....	10 00
Agricultural department.....	33 00
Fair circuit.....	8 40
Machinery department.....	30 43
Hardware.....	420 21
Freight.....	526 41
Building, repairs and labor on grounds, Lumber.....	4,794 01
Insurance.....	6,019 13
Horse department.....	11 50
Miscellaneous department.....	223 58
Poultry department.....	32 86
Ladies' Cottage.....	40 50
Booth renting.....	20 00
Art department.....	141 19
Bill posting.....	196 44
Check room.....	17 54
President's lunch room.....	26 60
Decorating.....	209 79
Horticultural society.....	69 34
Police.....	1,400 00
Meal tickets.....	195 30
Needlework department.....	261 26
Power.....	12 50
Forage.....	501 51
Hotels and board.....	1,706 46
Dairy department.....	198 00
Bicycle race.....	32 95
Ribbons and badges.....	100 00
Gates and gate-keepers.....	56 99
Music department.....	277 03
Livery.....	172 23
Transportation.....	31 00
Bee and honey department.....	36 65
Manufacturers' department.....	31 00
Marshal's department.....	39 50
Military drill.....	191 15
Sheep department.....	807 00
Rent of grounds.....	36 65
Implement department.....	550 00
Cattle department.....	45 05
Carriage department.....	134 60
Reception Committee.....	14 25
Swine department.....	12 00
Switching.....	18 25
Water.....	287 50
Whole amount.....	13 98

\$24,967 99

MONEY RECEIVED BY BUSINESS COMMITTEE AND PAID TO TREASURER.

BOOTH LEASES.

1883. Lease No.	
Aug. 21. 1 Major August Goebel.....	\$160 00
2 Albert Stacy & Co.....	80 00
3 Forcier & Wade.....	48 00
4 Kimberg & Brassard.....	48 00
5 Dr. Jordan.....	60 00
6 Mrs. O'Connor.....	30 00
7 Godfrey Loranger.....	48 00
8 A. Ochsenhirt.....	40 00
9 Ladies, Cass Ave. M. E. ch.....	80 00
10 James Comerford.....	40 00
11 Wm. Amrhen.....	30 00
12 Hock & Tate.....	60 00
13 Joseph Thomas.....	60 00
14 McKenzie & Summers.....	80 00
15 Grietz & Co.....	48 00
16 Mrs. Gustavus & Mrs. Ottob.....	80 00
17 Wm. Beaufait.....	32 00
18 Charles M. Welch.....	80 00
19 Ladies, Cass Ave. M. E. ch.....	100 00
20 W. C. T. U. Society.....	24 00
21 Owens & Gorman.....	48 00
22 Heckman & Rybski.....	80 00
23 Jacob Youngblood.....	56 00
24 Knorr & Schweinsberger.....	48 00
25 John Mahoney.....	56 00
26 A. Stacey & Co.....	56 00
27 Huff & Lawrence.....	16 00
28 W. B. Button & Co.....	40 00
29 Wm. Kempter.....	60 00
30 Patterson Bourgois.....	84 00
	48 00

1883. Lease No.

Sept. 11.	31 Joseph Kahn & Co.	\$60 00
	32 H. Jacobs	16 00
	33 Thomas Swan	100 00
	34 Farnam & Phelan	64 00
12.	35 M. A. McGowan	16 00
	36 P. J. Clair	56 00
	37 Farnam & Phelan	8 00
13.	38 Matthew Higgins	48 00
Sept. 13.	39 Jacob Youngblood	15 00
14.	40 L. A. Wilcox	48 00
	41 A. J. Dayton	32 00
	42 Jacob Youngblood	48 00
15.	43 W. S. Camp	35 00
	44 John Arnett	15 00
	45 Conrad Caspers	18 00
	46 Spindler & Wise	64 00
	47 P. Michels & Co.	80 00
Sept. 15.	48 A. Vanvegan	48 00
	49 Britt & Bros.	21 50
	50 G. W. Donaldson	125 00
17.	51 A. J. Dayton	8 00
	52 Max Wolff	12 00
	53 J. H. McKinney	40 00
	54 H. Cohen	24 00
	55 H. Cohen	15 00
	56 J. B. Wilcoxson	16 00
	57 C. Ellis	25 00
	58 M. Berger	12 00
	59 J. Williams	20 00
	60 Mrs. Kipkes	30 00
	61 A. G. Shafer	30 00
	62 C. McMillan	6 00
	63 M. Fleischman	6 00
	64 Geo. Iveson	25 00
	65 C. G. Vaughan	34 00
	66 L. D. Sidebottom	10 00
	67 L. E. Canfield	15 00
	68 S. L. Harmon	5 00
	69 Charles Bengough	15 00
	70 Jacob Ochietseie	10 00
	71 Mrs. Festener	20 00
	72 Edward Hill	16 00
	73 W. H. Halleck	40 00
	74 John Nelson	15 00
	75 Moses, Fosh & McKay	20 00
	76 Walter Caudy	15 00
	77 A. Minzer	10 00
	78 M. Cridel	10 00
	79 C. C. Bangs	15 00
	80 H. Cook	10 00
	81 A. B. Radabaugh	15 00
	82 Fish Bros.	12 00
	83 E. Loranger	23 25
	84 Mittenhal	10 00
	85 W. D. Parker	15 00
	86 L. Art	10 00
	87 C. Omas	12 00
18.	88 Antoine Vanacker	15 00
	89 W. J. Torrens	32 00
	90 Wm. Leon and George G. Robska	5 00
	91 M. Samuels	10 00
	92 Gilbert Lewis	2 50
	93 John Mahoney	5 00
	94 E. G. Angel	30 00
	95 Andrew Miller	25 00
	96 A. H. Dalley	10 00
	97 Henry Miller	20 00
	98 Wm. Borden	36 00
	99 E. W. Banks	5 00
	100 Thomas Pine	5 00
	101 O. A. Tagget	2 00
	102 F. Levitsky	10 00
	103 W. J. Torrens	10 00
	104 Jacob Spector	12 00
	105 John Mercer	7 00
	106 Rodfe & Hor	15 00
	107 D. L. Reynolds	5 00
	108 Hickman Bros.	18 00
	109 Edward Surprise	7 50
	110 Alexander Yenor	5 00
	111 E. W. Wiggins	100 00
19.	112 C. A. Taget	5 50
	113 Joseph Bowers	25 00
	114 A. Pertmen	15 00

1883. Lease No.

Sept. 19.	115 Alexander Spattie	\$5 50
	116 J. McKechn	5 00
	117 W. J. Decker	5 00
	118 Charles Roderick	7 50
	119 Alfred David	5 00
20.	120 Fred. Whitmore	3 00
	121 Mittenhal	2 00
	122 A. Stone	4 00
	123 A. Millett	12 00
	124 M. P. Schenck	15 00
21.	125 A. Devine	3 00
	126 Alexander Spatter	2 00
	127 J. D. Clanberg	\$3 00
	128 M. Cain	7 00

Total am't of booth leases \$3,832 25

MONEY PAID TREASURER BY W. H. COBB,
CHAIRMAN OF BUSINESS COMMITTEE.

1883.	Total am't received from booth leases	\$3,832 25
Sept. 26.	Received rebate on insurance	2 87
	Received rebate on freight bills	15 00
June 2.	Received on account Detroit subscription	250 00
	Received for sheep pens sold at Jackson	50 00
Sept. 26.	Received for check room	39 42
	Received for sugar tongs and two dozen spoons	2 27
	Received from sale of lumber, E. P. Campbell	3,000 00
Dec. 13.	Received for teaspoons	1 95
	Received for butter knives sold	1 50
	Total	\$7,195 26

INVENTORY LIST OF STATE FAIR GOODS
AT KALAMAZOO, MICH.

BOX NO. 1.

3 Dozen silver table knives.
3 Dozen silver table forks.
4½ Dozen silver teaspoons.
½ Dozen silver butter knives.
½ Dozen silver pickle forks.
1 6 Dozen silver sugar forks.
1 Dozen tin teaspoons.
2 5-6 Dozen tablespoons.
½ Dozen wooden mustard spoons.
1 Fancy teapot.
5½ Dozen iron table knives.
5½ Dozen iron table forks.
½ Dozen carving knives and 1 steel.
1 Large spoon.

BOX NO. 2.

2 U. S. flags.
1 Ship flag.
1 President flag.
1 State Fair flag.
1 Pomological flag.
SIGNS.
1 Police.
2 Carriage.
1 Baggage checked.
1 Small rooster.
1 Machinery.
1 Ladies' waiting room.
1 President's room.
1 President's room.
1 Machinery hall.
1 Poultry hall and rooster (large).
1 Fine art hall.
1 Gents' water closet.
1 Poultry hall.
1 Children's department.
1 Fruit hall.

- 1 Ticket officer.
- 1 Treasurer's office.
- 1 Miscellaneous.
- 1 Secretary's office.
- 1 Agricultural.
- 1 Ladies' room.
- 1 Exposition hall.
- 1 Telephone and telegraph.
- 1 Dairy hall.
- 1 Manufactures.
- 1 Ticket office.
- 1 Crop correspondents.
- 1 Window curtains.
- 1 Lot black cambric.
- 1 Lot new mosquito bar.

BOX NO. 3.

- 1,000 Yards cambric, R. W. & B.
- 1 Centre piece cambric, R. W. & B.
- 1 Lot mosquito bar, old.
- 1 Lot mosquito bar, new.
- 1 Small piece toweling.
- 1 Small piece curtaining.
- 1 Small piece green cambric.
- 1 Small piece brown cambric.

BOX NO. 4.

- 1 Small coffee boiler.
- 1 Large coffee boiler.
- 5 Tin dippers.
- 3 Coffee pots.
- 5 Wash basins.
- 1 Small dripping pan.
- 2 Large dripping pans.
- 2 Large wash pans.
- 1 Wash boiler.
- 2 Tin pans.
- 1 Tea kettle.
- 2 Spiders.
- 2 Tin pails.
- 1 Milk pail.
- 3 Wash basins.
- 1 Wash basin.
- 1 Bran ling iron.
- 1 Small funnel.
- 1 Scrubbing brush.
- 1 Small oil can.

BOX NO. 5.

- 14 Lamps.
- 8 Lanterns.
- 1 Lot chimneys.
- 1 Package wicks.

BOX NO. 6.

- 122 Square chicken tins.
- 21 Round chicken tins.
- 13 Mattresses.
- 26 Comfortables.
- 6 Pillows.
- 4 Bundles of department flags.
- 1 Ladies' flag and staff.
- 6 Square ticket boxes.
- 4 Long ticket boxes.
- 1 Large bell.
- 2 Watering pots.
- 1 Lot glass jars.
- 3 Small oil cans.
- 3 Rolls tar paper.
- 1 Oil can.
- 1 Jug.
- 1 Can paint.
- 2 Paint brushes.
- 1 Lot glass and sash.
- 2 Pigeon-hole boxes.
- 3 Rolls paper garland.
- 1 Secretary table.
- 2 Arm chairs.
- 9 Common chairs.
- 1 Bushel basket.
- 10 Brooms.
- 1 Three-gallon crock.
- 1 Snow shovel.
- 2 Wooden hay rakes.

- 2 Spades.
- 2 Iron rakes.
- 1 Round-pointed shovel.
- 1 Hoe.
- 1 Shovel.
- 1 Barley fork.
- 2 Pitchforks.
- 1 Axe.
- 1 Pickaxe.
- 1 Post auger.
- 1 Scoop shovel.
- 1 Adze.
- 1 Iron bar.
- 1 Spirit level.
- 3 Nail cutters.
- 1 Cold chisel.
- 1 Wrench.
- 1 Square.
- 1 Saw.
- 1 " "
- 1 Hatchet.
- 2 Pair gas-tongs.
- 1 Wheelbarrow.
- 1 Scythe and snath.
- 1 Large piece rubber belting.
- 1 Small piece rubber belting.
- 8 Wooden pails.
- 5 Wash-tubs.
- 1 Waterpipe key.
- 1 Shaft key.
- 1 Pair tackle and rope.
- 1 Coil clothes line.
- 1 Log chain.
- 10 Cups and chains.
- 5 Cups without chains.
- 2 Wash basins.
- 1 Broken keg finishing nails.
- 1 Broken keg finishing nails.
- 1 Broken keg 10 nails.
- 1 Broken keg 20 nails.
- 1 Broken keg shingle nails.
- 1 Broken keg mixed.
- 1 box nails.
- 1 Lot stove-pipe.
- 1 Box pieces water pipe.
- 1 Looking-glass.
- 1 Dust-brush.
- 1 Stencil outfit.
- 2 Boxes hinges, locks, etc.
- 1 Box stop-locks and faucets.
- 1 Box chalk.
- 3 Bolls wire-screen chicken-coops.
- 9 Old tables.
- 1 Rubber hose and cart.
- 1 Box baggage checks.
- 1 Box old mosquito bar.
- 12 Globe-valves.
- 5 Old benches.
- 1 Box towels, etc.
- 18 Damask towels.
- 8 Common towels.
- 12 Kitchen towels.
- 7 Table cloths.
- 1 Old bedstead.
- 1 Track roller.
- 1 Drag.
- 1 Track scraper.
- 1 Plow.
- 1 Sledge hammer.
- 1,716 ft. $\frac{3}{4}$ inch water pipe.
- 1,062 ft. 1 inch water pipe.
- 321 ft. $\frac{1}{2}$ inch water pipe.
- 1 Lot chicken coop fronts.
- 33 Pieces shafting and fixtures.
- 3 Iron band-wheels.
- 40 Shaft horses.
- 1 Wagon and tank.
- 1 Smoke stack and front.
- 11 Lamp posts.
- 11 Long water troughs.
- 4 Round water troughs.
- 8 Wooden horses.
- 1 Grindstone.

All of which is respectfully submitted.

W. H. COBB,
A. O. HYDE,
F. V. SMITH.

Upon motion, the addresses of the retiring and incoming Presidents were referred to a committee of three to be appointed, for a division of subjects.

The President announced as such committee, Messrs. Chamberlain, Baxter, and Shoemaker.

I. H. Butterfield, Jr., Superintendent of Division A (cattle), reported as follows:

DIVISION A—CATTLE.

To the President and Executive Board of the Michigan State Agricultural Society:

The exhibit of cattle at the last Fair was unprecedented in numbers and in most classes in quality. The total number of entries on the Books of the Secretary were, including herds and sweepstakes, 759, of which about 600 head of cattle were exhibited, the remainder failing to appear on account of the presence of Texas fever in the vicinity of the city of Detroit and false rumors regarding the same.

It was in one respect fortunate that more did not come. As it was, about 160 new stalls were required, besides the number that had been used at former exhibitions.

The number of entries and amount of premiums awarded in the several classes were as follows:

Class	No. Entries.	Amount Awarded.
1—Short Horns.....	266	\$616 00
" 2—Devons.....	59	358 50
" 3—Herefords.....	60	367 50
" 4—Ayrshires.....	25	273 00
" 5—Jerseys.....	90	563 50
" 6—Galloway and Angus.....	20	188 00
" 7—Holstein.....	120	491 50
" 8—Grades.....	75	231 00
" 9—Oxen and Steers.....	10	89 00
" 10—Fat Cattle.....	29	199 00
" Non-enumerated Guernseys.....	5	25 00
Total.....	759	\$3,402 00

It will be seen that Shorthorns continue to be popular. They continue to increase in numbers and improve in quality. Devons remain about stationary as to numbers and are slowly improving in quality. A manifest improvement in size would increase their popularity in this State.

The exhibit of Herefords was very fine this year, and the number was somewhat greater than ever before. Their magnificent beef qualities make them worthy of encouragement in this State, and the great demand for them from the west will make their breeding profitable.

Ayrshires are neglected in this State, the only herd at the fair, owned in the State, being a small one from the Agricultural College. While they have some qualities which recommend them to farmers in sections of rough or scant pastures, where a dairy cow is wanted, I do not deem them desirable in Michigan, in the presence at least of other breeds that are for every purpose better adapted to our soil, climate, and methods of farming.

Jerseys are increasing in the State, and show a slight increase in numbers at the fair. They are becoming quite popular as a family cow for the village or city, and are proving valuable for the butter dairy. Polled blacks are not increasing fast, and those bred are mostly sold for the Western market. One herd of Galloways and one of Angus was exhibited.

Holsteins and Dutch Friesians are increasing fast and are becoming quite popular. At least one hundred and sixty head, imported direct from Holland, have been brought into the State during the past year. All who have tried them are enthusiastic in their praise. For the milk and cheese dairy, they are undoubtedly superior and for general purposes are likely to find a place.

The number of grade cattle shown was nearly as large as ever before, and as only females are shown they may be considered as one of the largest exhibits in point of numbers. The quality was superior, and since they are the medium through which is shown the merits of the various improved breeds for practical use, their exhibition should be encouraged. Working oxen and steers are few in numbers and add very little to the value of the exhibit. One well fattened steer of fine proportions and good weight will attract more attention than all of the usual exhibit in this

class. If their encouragement is continued, I would recommend a premium for the best "trained yoke of steers or oxen."

In fat cattle there was a good display, and the quality was superb. There is evidently an increased interest and improvement in this line, and the number of well fattened, early maturing steers is greatly on the increase. In this class I suggest that the premium for the steer showing the greatest gain per day be made a sweep-stake and that the amount now offered be divided into three premiums, for steers one and under two years, two and under three years, and three and under four years—each age competing separately.

A premium for the best fat cow would frequently bring out some very fine specimens of beef animals of some of the improved breeds.

There are at least two pure breeds in the State that have merit, which are not enumerated in the premium list, but they are not numerous enough at present to warrant their addition especially in view of the fact that already cattle receive a very large portion of the money awards of the Society. They are the "Guernsey" and the "Red Polled."

I have been asked by some to recommend a premium for a herd of fine young cattle all bred by the exhibitor. This would undoubtedly make a fine exhibit.

Altogether our exhibit of cattle is a credit to the breeders, the Society, and the State.

IRA H. BUTTERFIELD, JR.,
Superintendent.

Report accepted and referred to the Committee on Premiums.

Superintendent Smith, of Division B, was given further time to report.

Superintendent Lessiter, of Division D (Swine), reported as follows:

DIVISION D—SWINE.

To the President and Executive Committee of the Michigan State Agricultural Society:

In Class "D," Swine, the number of entries was 160; last year, 248. The low price of pork the past year has no doubt lessened the interest in this department, yet the show was a good one as regards quantity and quality, the Berkshires taking the lead in numbers. Entries: Berkshires, 48; Essex, 27; Suffolk and Small Yorks, 22; Poland-Chinas, 42; Chester Whites and Large Yorks, 17; Fat Hogs, 4. Total awards in this Class, \$586. Last year, \$656.

The Superintendent desires to thank the gentlemen who acted as judges at the late Fair for their careful and patient labor, knowing them to be well qualified to discharge the duties devolved upon them. I find it is quite difficult to obtain good, competent judges to serve without pay.

All of which is respectfully submitted.

JOHN LESSITER,
Superintendent.

Accepted and referred to Premium Committee.

Superintendent Chamberlain asked for further time to report.

Granted.

Superintendent Anderson, of Division "M" (Musical Instruments, etc.), offered the following:

DIVISION M—MUSICAL INSTRUMENTS, ETC.

To the President and Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN—The number of entries in Division "M" was as follows:

Class 54, Musical Instruments, Sewing Machines, etc., 29; Class 55, Watches, Jewelry, Plated Ware, etc., but one entry was made. In Class 54, no premiums were offered. Class 55, \$23 was offered but none awarded.

I would recommend a change in this Division: Placing Musical Instruments and Sewing Machines in a Class by themselves, and close the time for making entries on Thursday, at 6 p. m., of the week preceding the fair. I consulted with the exhibitors at our late fair upon this subject and all were unanimous, and hoped the rules would be changed. As no premiums are offered it is simply a matter of space. They

desire to know how much room they are to occupy, which will govern them in shipping their instruments; also the number of operators required.

Respectfully submitted,

M. P. ANDERSON,
Superintendent.

Accepted and referred to Premium Committee.

Superintendent Burrington, Division E (Poultry), reported the following:

DIVISION E—POULTRY.

To the President and Executive Committee of the Michigan State Agricultural Society:

The exhibition of Poultry at the State Fair of 1883 was large and on the whole creditable. In every class there were many birds that were very fine, while some were quite inferior in quality, and did no credit either to the exhibitor or the Society. Those inferior in quality were mostly exhibited by those who competed for the premiums for the best, most varied, and valuable collection. It occurred to the Superintendent that it might be for the interest of this Society to omit this premium from our list in future. The exhibit at our last fair was much too large for the space allotted to this department. Nearly one-half had to be exhibited in the coops in which they were shipped. These we were obliged to arrange through the centre of the building, piled one upon another, leaving but a narrow space for visitors to pass through, and giving exhibitors a poor chance to display their fowls.

I would recommend that in future those who exhibit pigeons be required to furnish their own cages. It also seems to me that it would be better to offer a small premium for the best pair of each variety of pigeons and strike out the premium for the largest collection.

The number of entries in this division was 430, and premiums were awarded to the amount of \$289.

Respectfully submitted,

J. Q. A. BURRINGTON,
Superintendent.

Accepted and referred to Premium Committee.

The Secretary read the report of Superintendent of Divisions O and Q, as follows:

DIVISIONS O AND Q.

To the President and Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN—The year of '83 in my department was a flourishing one. The entries were as follows:

Class 58.	Entries,	17	Amt. Premiums,	\$21.00, or Diploma.
" 59.	"	69	"	44.00
" 60.	"	191	"	106.00
" 61.	"	72	"	65.50
" 62.	"	33	"	28.00

Total,	382	•	\$264.50, or Diploma.
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Children's Department, Entries, 13. Amount of Premiums, \$8.50.

You will see that the entries are large and the amount of premiums awarded very reasonable in comparison. This was due to the great discretion displayed by Committees. This department seems to be growing every year, and has now, I think, become fully established as one of the most interesting connected with the fair. There were fewer complaints from exhibitors this year than ever before, which I think also speaks well for the Committees. The Premium List could be improved a little each year, owing to the new kinds of work constantly coming into use; but this is of course a matter which shall be regulated by your honorable body. The total amount awarded I recommend to be made no larger. The Children's Department was poorly filled this year, and the entries smaller than ever before. This can only be accounted for by a lack of interest. However this, I trust, will only be a temporary complaint, and look for quite an enlarged list of entries next year. I would thank all the gentlemen who so kindly aided me in the discharge of my duties, and respectfully submit the above.

MINNIE H. BROW,
Superintendent.

Accepted and referred.

Superintendent Wood, of Division L. (Manufactured Goods), offered the report for that department as follows:

DIVISION L—MANUFACTURES.

To the President and Members of Executive Committee of Michigan State Agricultural Society:

Classes 48, 49, 50, 51, 52, and 53, in Division L., were well represented, and the room assigned to that department was crowded, and made a fine show.

Class 48, Materials, there were 20 entries, \$75 offered, \$58 awarded.

Class 49 and 50, Factory Made and Articles of Dress, there was no money offered, but many fine displays that were of much interest.

Class 51, Articles of Leather and India Rubber, there were 117 entries, \$128 offered and \$82 awarded. Judging from this year's show, I would recommend striking off the premiums on the single articles of trunks, boots and shoes, making in all \$17; these articles competed in the display of same goods.

Class 52, Articles of Furniture, the amount offered was \$212, one diploma, also one silver medal. There were 76 entries, \$87, two diplomas, and three silver medals awarded. I would suggest the changing of the premium list and putting the display of all kinds of furniture first on list, then parlor, next chamber, and perhaps drop third prize and add more money to display of all kinds.

Class 53, Stoves, Iron Work, and Ornamental Concrete Work. There were 52 entries, \$35 offered and \$23 awarded.

All of which is respectfully submitted.

A. F. WOOD,
Superintendent.

Accepted and referred.

Superintendent Hanford was granted further time for his report.

Superintendent Reed, of Division G (Dairy Articles), read the following report, which was accepted and referred:

DIVISION G—DAIRY ARTICLES.

To the President and Executive Committee of the Michigan State Agricultural Society:

The Superintendent of Division G would respectfully report: There were 127 entries, divided as follows: Class 35, 83 entries; Class 36, 28 entries; Class 37, 16 entries. Premiums awarded in Class 35, \$184.00; Class 36, \$41.00; no premiums were offered in Class 37. Total cash premiums, \$226.00. From remarks made by exhibitors and my own observation, I would recommend not to offer any cash premiums in Class 35, on dairy fixtures.

The exhibitors of bread and butter complain of want of arrangement to keep the bread clean and butter cool. I would recommend that something be done in that direction, and see if we cannot draw a larger number of exhibitors in this department.

Respectfully submitted.

F. L. REED.

Secretary then read the report of the Superintendent of Division F (Farm Products), as follows:

DIVISION F—FARM PRODUCTS.

To the President and Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN,—I herewith present a synopsis of the exhibition in Division F at the annual fair of 1883:

CLASS.	No. of Exhibitors.	No. of Entries.	Amount Premiums Offered.	Amount Premiums Awarded.
32.....	16	70	\$245	\$137
33.....	11	22	281	15
33½.....	1	2	100	50
34.....	1	8	50	14
Total.....	29	102	\$676	\$216

The exhibit as shown above was very small, probably the smallest that has been shown at any fair since the organization of the society. This was wholly owing to the severe frost of August which destroyed all vegetation liable to injury, which we trust will not occur again. With favorable weather we may look forward to an excellent exhibition for our fair of the current year.

Respectfully submitted,

JOHN L. MITCHELL,
Superintendent Division F.

Jackson, January 4, 1884.

Accepted and referred.

Superintendent Baxter, of Division II (Honey, Bees, etc.), reported for that department as follows:

DIVISION H—HONEY, BEES, ETC.

To the President and Executive Committee of the Michigan State Agricultural Society:

The Superintendent of Bees and Honey would report that, notwithstanding the unsuitable character of the building and the very unfortunate location, in the rear of, and entirely hidden by, one of the noisiest shows admitted to the grounds, the exhibition was an exceedingly interesting and valuable one. There was an exhibit of articles of a market value of over \$2,000, embracing all kinds of articles upon which premiums were offered, and several others which were deemed worthy of special mention, and on some special premiums were recommended and awarded. Entries, 88; premiums awarded, \$188; special, \$13.98. Total, \$201.98.

Owing to the inability of your Superintendent to be present the week before the fair, he secured the services of H. D. Cutting, Esq., as assistant superintendent, and to his knowledge, special fitness, and untiring efforts, much of the success of the exhibit is due. I would take this opportunity to express my sincere thanks to him for such assistance.

I would respectfully recommend that for this year a more suitable building be provided; that it be so placed as to invite attention, and not, as last year, to be found only after diligent engineering and search; that larger premiums be offered; the list of articles increased, and the premium list carefully revised.

It would seem to your Committee that the growing importance of this industry and the amount invested warrant an increase of premiums to from \$250 to \$300.

Respectfully submitted,

W. J. BAXTER.

Accepted and referred.

Superintendent Sterling read the following report, which was accepted and placed on file:

Mr. President and Gentlemen:

Your Committee on Police report: We employed for day and night civil police and watchmen, 21 men, and paid them for services \$161.00. Superintendent Conely of the Metropolitan Police, very kindly furnished in all twenty-four policemen, five of them mounted. One Sergeant O. H. Britton was on the grounds all through the fair, from morning until night, and left two of his men for night duty. Paid for horses for the mounted men, \$72.00. Paid for telephone from police headquarters on the grounds, to police headquarters and station in the city, \$25.00. The grounds were cleared at 6 p. m. of all except persons having business and sleeping within the enclosure. Four persons were arrested as suspected pickpockets, one for larceny and one for disturbance. Good order prevailed through the fair week, much to the satisfaction of your committee, and I believe to the patrons of the fair generally; notwithstanding some correspondents differ with us through such papers as chose to or consented to publish the same. The chairman of the committee on police was on the grounds day and night through the fair, and knows whereof he speaks.

If further evidence in regard to law and order at our last fair be required we will refer to the report of Sergeant Britton to Superintendent Conely of the Metropolitan Police, which will probably be on record.

J. M. STERLING,
WM. BALL.

The secretary read a notice of the "Eleventh Annual Convention of the

Michigan State Association of Agricultural Societies," to be held at Lansing, January 30 and 31st inst.

After some informal discussion the Board adjourned to meet on Tuesday at 9 o'clock A. M.

SECOND DAY.

RUSSELL HOUSE, }
Detroit, January 15, 1884. }

The Committee resumed its session this morning, President Fralick presiding.

The roll was called, and the following gentlemen answered to their names:

President Fralick, Treasurer Dean, Messrs. Sterling, Rising, Hanford, Ball, Lessiter, Cobb, Hyde, Reed, Smith, Burrington, Wood, Chamberlain, Angel, Howard, Young, Butterfield, Gilbert, Anderson, Baxter, Parsons, Shoemaker, Phillips, and the Secretary.

On motion, the reading of the journal was dispensed with.

Superintendent Howard, Division C (Sheep), reported the following:

To the President and Members of the Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN—The number of entries in Division C (Sheep) were four hundred and thirty-six.

The number of entries and awards in each class were as follows:

Class 21—	Entries, 69;	amount awarded.....	\$ 304 00
" 22—	" 88	" "	214 00
" 23—	" 15	" "	59 00
" 24—	" 40	" "	146 00
" 25—	" 92	" "	152 00
" 26—	" 24	" "	147 00
" 27—	" 55	" "	152 00
" 28—	" 15	" "	35 00
" 29—	" 38	" "	105 00
Total.....	436	.....	\$1,314 00

Respectfully submitted,

D. W. HOWARD,
Superintendent.

Accepted and referred.

Superintendent Gilbert, Division J (Vehicles), reported as follows:

DIVISION J—VEHICLES.

To the President and Members of the Executive Committee of the Michigan State Agricultural Society:

In accordance with a rule requiring Superintendents of the various Departments to submit an annual report, I respectfully present the following:

Division J, vehicles, contained a very large and excellent display of fine work, a number of manufacturers from the interior of this State making some remarkably fine displays, which I think worthy of special mention, among them being Clark & Co., Lansing, Mich. Manufacturing Co., Jackson; Kalamazoo Wagon Company; Romeo Carriage Works, and Ovid Carriage Co. There was also a good display of platform and farm wagons.

Very respectfully,

JOHN GILBERT,
Superintendent.

Accepted and referred.

Superintendent Rising, of the forage department, offered the following, which was accepted and referred:

FORAGE DEPARTMENT.

To the President and Executive Committee of the Michigan State Agricultural Society:

The superintendent of forage would report that there was a very good feeling in my department manifested as far as I could judge, but owing to the large stock on exhibition, our expenses were very large; and the time has come, when, in my opinion, the Society should take some step to lessen the expense, either by charging for stalls and pens or for forage. The liberal policy of the Society and railroads brings a class of stock on the grounds that is not beneficial to the Society, nor ornamental to the exhibition, but very expensive to the Society in the building of stalls and pens, also forage and exhibitors' passes.

Respectfully submitted.

E. W. RISING.

Chief Marshal Hyde reported for the marshal's department as follows:

Mr. President and Gentlemen of the Executive Committee:

We have to say in contrast with what we said last year in annual report, that during the State fair held in this city last September, we had a very pleasant time. The apparent wish of all was that good order might prevail.

Our duties were made less arduous and attended with a good degree of success by the good arrangement of fences and gates in the vicinity of exhibition tracks. It speaks well for Michigan when we see 30,000 of her people in one general promiscuous assembly, all disposed to act in a becoming manner. Our assistant marshals, Messrs. Hodge, Hinds, and Phillips, were assistants indeed, enabled by their experience and good judgment, to always be in the right place at the right time. We cannot speak in too high terms of the police kindly furnished by the city—very diligent and obliging in discharging the duties assigned them. Exhibitors were prompt in bringing their stock upon the ground, thereby helping very much to facilitate business, enabling superintendent and judges to get through with their daily work in good season. We find much of our success in working close to a well arranged programme.

We do not know of being charged with any needless expense in this department, but would gladly reduce the aggregate amount if we could see where to do it. Our men do their hard work without any pay except actual expenses. We have to pay for our horses.

A. O. HYDE.

Chief Marshal.

Accepted and referred.

The secretary then read a communication from the secretary of the "Red Polled Cattle Club of America," asking that a class be made for these cattle. On motion referred to the committee on premiums.

A letter for Prof. Samuel Johnson of the State Agricultural College donating to the Society the premiums awarded to the cattle exhibited by the College at the last annual fair was read, and upon motion accepted with thanks.

Superintendent Chamberlain, division K (machinery), reported as follows:

To the Executive Committee of the State Agricultural Society:

The superintendent of division K, class 46, machinery, would respectfully report: The number of entries in this class was 75. The exhibit was very creditable to this branch of industry, and shows that those engaged in it are alive to the demands of the State in this direction. The hall was thronged during each day of the fair by interested spectators, and those in charge of the exhibit manifested a desire to give every opportunity for examination of their machines. The cutting off of all premiums in this division has resulted in entire satisfaction to all exhibitors. In class 47 there were no entries.

I was appointed superintendent of division P, classes 63 and 64, but through the kindness of Mr. C. W. Young, I was relieved by him of this charge, and he will report to you on the same.

WM. CHAMBERLAIN.

Accepted and referred.

The bond of the Secretary was approved by the President, and referred to the committee on finance.

A communication from Mr. J. L. Keckley was read and referred to committee on premium list.

The special committee on president's address offered the following:

Your committee appointed to report upon the recommendations of the retiring president, and of the recommendations of the president elect, would respectfully report that they have had the same under consideration, and would report that that part of President Fralick's address that relates to finance be referred to the committee on finance; so much as relates to premiums, to the committee on premium list; so much as relates to exhibitors and their assistants who are admitted at a gate set apart for their use, to committee on rules.

That so much as relates to the Norman, Percheron, and Clydesdale horses, be referred to the committee on premium list.

That so much as relates to the State Horticultural Society be referred to a special committee of three.

That so much as relates to the location of the State fair be referred to a special committee of five.

Your committee would further recommend that so much of the address of the president elect as relates to the location of the State fair be referred to the special committee heretofore suggested.

That so much as relates to exhibits of dairy products, manufactured goods, farm implements, and machinery be referred to the committee on premium list.

So much as relates to crop reports be referred to a special committee of three.

That so much as relates to fourth premiums be referred to the committee on premium list.

That so much as relates to the Agricultural College and to the establishment of an experimental station be referred to the committee on Agricultural College.

That so much as relates to the sixth rule of this society, and infringements of said rule, be referred to the committee on rules.

That so much as relates to forage, to the committee on rules.

That so much as relates to the fair circuit, and the time of holding the State fair, be referred to the committee of the whole.

WM. CHAMBERLAIN,
W. J. BAXTER,
M. SHOEMAKER.

Accepted and adopted.

Mr. Ball reported for the superintendents of gates as follows:

To the Executive Committee of the Michigan State Agricultural Society:

The committee on gates and gatekeepers would respectfully report that, as a rule, good order was observed at the gates. The gatekeepers, in the main, were efficient and did their work with fidelity and good judgment.

The new rule adopted at the last winter meeting, with reference to attendants' tickets, proved of much value, and with slight modifications, should be continued. The powers and duties of the superintendents of gates are not well defined, and questions occasionally arise that need solution, and the fact exists that it is difficult to know just who has the full control of such matters. It is suggested that the powers and duties of superintendents of gates and gatekeepers be defined in some manner by the executive board.

WILLIAM BALL,
J. M. STERLING.

Mr. Baxter moved that the report be accepted, and as much of it as refers to defining the duties of the superintendents of gates be referred to the committee on rules.

Superintendent Young, of division P (miscellaneous), reported as follows:

DIVISION P—MISCELLANEOUS.

To the Executive Committee of the State Agricultural Society:

GENTLEMEN,—Having been assigned to this department after the commencement of the fair, I beg leave to submit the following report:

The space allotted was all very closely occupied, and even then proved inadequate to the wants of the exhibitors, as several articles had to be placed on the outside of the hall.

The number of entries in class 63, this division, was 48, and the amount of premiums awarded was \$52. In class 64 there were 31 entries and \$11 awarded. There has been but one exhibitor with whom there was any misunderstanding, viz.: The agent of the "Bench Wringer of the Perfection Manufacturing Company, of Toledo," who seems to insist that a diploma was promised him; but the report of the judges does not show that to be the case.

In view of the character of many of the exhibits in this department, I should deem it wise to abridge even more than is now done, perhaps, the awarding of money premiums, thinking the assignment of space for the purposes of calling the attention of the public to their wares, to be quite ample to repay them for their trouble.

All of which is respectfully submitted.

C. W. YOUNG.

Accepted and referred.

J. M. Sterling, chairman of the committee on transportation, offered the following, which was adopted:

Mr. President and Gentlemen:

Your committee on transportation report our arrangements with the following roads, viz.: Michigan Central and its branches; Flint & Pere Marquette; Detroit, Lansing & Northern; Detroit, Grand Haven & Milwaukee; Grand Trunk; Chicago & Grand Trunk; Grand Rapids & Indiana; Wabash, St. Louis & Pacific; Chicago & Western Michigan, were entirely satisfactory as usual, and we hope the members of this board, and the Society generally, duly appreciate the privileges we have enjoyed so many years, being more liberal than those granted to any other State fair. So far as our knowledge goes, exhibitors at other State fairs have to pay half-rates on stock and articles, while we on the roads named above, get free transportation when returned to place of shipment with same ownership.

At our fair of 1883, the Michigan Central switched to and from the fair ground in all 365 cars, 240 of which belonged to the Michigan Central, and were switched free. Those from other roads paid switching charges, \$2.50 each. It will be seen that this is a large number of cars to be taken out of profitable business and held ten or twelve days for an accommodation, and it would be a sin if it were not duly appreciated by all who receive the benefit. We are especially indebted to General Manager Ledyard, General Superintendent Brown, Division Superintendent Sutherland, Agent Benham, and all of their subordinates, for the dispatch in which so many cars were handled at our station on Cass avenue.

J. M. STERLING,

W. J. BAXTER,

W. L. WEBBER.

The same committee offered the following, which was adopted unanimously:

Resolved, That the special thanks of this executive committee, on behalf of all the great interests represented by the Michigan State Agricultural Society, are due, and are hereby tendered to the officers and managers of the Michigan Central railroad company; Flint & Pere Marquette; Detroit, Lansing & Northern; Detroit, Grand Haven & Milwaukee; Grand Trunk; Chicago & Grand Trunk; Grand Rapids & Indiana; Wabash, St. Louis & Pacific, and Chicago & West Michigan, for the very generous and liberal courtesies and privileges extended to the Michigan State Agricultural Society, and through them to all exhibitors and attendants, and that we assure such companies, through their respective officers and managers that their action in the premises is fully appreciated.

Supts. Smith and Phillips, Division B (Horses), reported as follows:

DIVISION B—HORSES.

To the President and Members of the Executive Committee:

The exhibition of horses at the last fair was the largest and best ever made by the society. Every class was well represented except class 11, thoroughbreds, in which was only one entry, and that not worthy a premium.

In class 12, horses of all work, there were 88 entries of great merit, and the premiums awarded in that class amounted to \$438. In roadster class 13, there were 60 entries—premiums awarded \$255. In class 14, breeder stock, there were 32 entries

and \$127 awarded. In class 15, gents driving horses, entries 15, amount awarded \$165. Class 16, draught horses, entries 99, premiums awarded \$352; class 17, carriage and buggy horses, entries 50, premiums awarded \$214; class 18, Michigan horses, stallions, entries 33, premiums awarded \$470; class 19, Michigan horses, mares and geldings, entries 39, premiums awarded \$480; class 19½, Michigan horse, thoroughbred, entries 6, premiums awarded \$100; class 20, sweepstakes for stallions with 6 of their get, entries 5, premiums awarded \$95; making the number of entries 428, and the amount awarded in this department \$2,696.

The distinguishing feature in this department was the great increase in quality and numbers of the draught horses. A thorough revision of the list is required, and a new classification demanded. Many animals—superior specimens of their kind—imported at great cost and exhibited at our show, were simply passed before the thousands on the grand stand for their admiration, but no evidences awarded them of merit, or that they were appreciated. These horses had been prize takers, and carried off honors in the countries from which they came. In our classification Normans, Clydesdales, Shires, and Punches are all grouped together as draught horses.

Your committee would recommend that the standard of weight be raised to 1,600 pounds.

F. V. SMITH,
G. W. PHILLIPS.

Accepted and referred.

Mr. Smith, to whom was referred the protest against Mr. Hendricks's team, reported that the protest should not be sustained.

Report accepted and adopted.

Mr. Parsons, of the committee appointed at the last annual meeting of the committee to prepare a testimonial for Chairman Gilbert, presented a very handsome set of solid silver forks and spoons (forty-two pieces), with the following report:

DETROIT, January 15, 1884.

GENTLEMEN:—Your committee directed to prepare some testimonial of respect and appreciation of the services of the chairman of the business committee, beg to say they have made their selection, and present the same to the executive committee.

PHILO PARSONS,
M. P. ANDERSON.

Mr. Butterfield, delegate to the Chicago convention, offered the following report, which was accepted and filed:

To the Executive Committee of the State Agricultural Society:

At the request of President Fralick, I attended the convention called by the commissioner of agriculture for the purpose of considering the question of contagious diseases among live stock in the United States. Mr. Wm. Ball, who was also requested to attend, was unavoidably detained at home.

The details of the proceedings of this convention have been so fully published that it only seems necessary to give a brief *resumé* of the subjects considered and the action taken.

The convention, as finally organized, was almost entirely of the cattle interest, and the action of the convention was directed toward the importance of eradicating contagious pleuro-pneumonia among cattle, a disease, fatal in character—which is present in a few of the Atlantic States—that is slowly extending against all efforts of States and individuals to prevent it.

The convention consisted of representative men from all the principal cattle States, and the whole action was directed to the consideration of the advisability of asking the congress of the United States to enact such laws and make such provision as will eradicate and thoroughly stamp out this dread disease.

There can be no further doubt of its presence, its fatal character, the difficulty of detection in its earlier stages, and consequent danger of spreading to the great cattle regions of the west.

The firm decision of the convention was, that the time had come for action, and that the only method of accomplishing any positive good is by act of congress.

To this end, a committee of one from each State represented at the convention, with Dr. Loring, the commissioner of agriculture, as chairman, who should go to Washington to formulate a plan and present it to congress, and insist upon its enact-

ment into a law that should forever banish this disease and prevent its future introduction.

There are minor contagious diseases, the principal of which is Texan, or Spanish fever, which were considered as needing attention, but it was thought best to deal first with the greatest and most dangerous difficulty.

In connection with others from this State present at the convention, Mr. Wm. Ball was selected as a member of the committee from this State.

J. H. BUTTERFIELD, Jr.

Mr. Butterfield then introduced Mr. H. H. Hinds, who addressed the committee, and stated that, along with Messrs. A. S. Brooks and C. F. Moore, he was appointed by the Michigan Short Horn Breeders' Association to present the question of contagious diseases among cattle to this committee, and ask that an appropriation be made to assist in paying the expenses of a delegate to congress. Messrs. Moore and Brooks then addressed the committee on this subject.

On motion of Mr. Anderson the matter was referred to a special committee of five.

President Fralick named as such committee, Messrs. Anderson, Butterfield, Baxter, Phillips, and Hanford.

Mr. Burrington reported upon protest referred to him last September, as follows:

To the Executive Committee of the State Agricultural Society:

In the matter of the protest of Mr. M. Esler in Division E, on White Leghorn chicks, I would respectfully report that the pair of chicks entered by Mr. Esler were ruled out by the awarding committee on the ground that they should have been entered as old fowls instead of chickens; that if the entry had been correct they would have been entitled to the first premium. Satisfactory evidence has been furnished the superintendent that the birds in question were hatched on the 24th day of last April; therefore they were wrongfully debarred from competition. I would recommend that the protest be sustained and that the first premium be given to Mr. Esler.

J. Q. A. BURRINGTON,

Superintendent.

On motion the report was accepted and adopted.

Mr. Young read a protest from Mr. D. Woodman, which was, on motion, tabled.

Mr. Chamberlain from the committee on State Agricultural College reported for that committee:

To the Executive Committee of the State Agricultural Society:

Your committee appointed at the last winter meeting to visit the State Agricultural College during the year and report to you at this meeting their views of the condition of this State institution, would report that in company with the president of this society and members of the executive committee, with other prominent agriculturists of the State, we visited the College on Wednesday, June 13, 1883, and were cordially received by its president and faculty, who were untiring in their efforts to give us every opportunity to view the College in all its departments. We spent the day in examining the buildings, the grounds, the stock, the grain, grasses, and fruits, as well as the departments of education, and found them in complete order, and we see no reason, with the ample provision made by the State for the encouragement of the science of agriculture and a thorough knowledge of all its branches, why the young men and ladies of this State who desire a practical education should not avail themselves of its privileges. In the annual visits of this society to the college, your committee believe that improvements are being made and the Agricultural College is attaining that standing which is a credit to the agriculturist of the State of Michigan, and every effort should be made on the part of

this society to aid the State Board of Agriculture in their efforts to make this a model institution, for its practical instruction in the science of agriculture.

All of which is respectfully submitted.

WM. CHAMBERLAIN,
A. F. WOOD,
JOHN LESSITER.

On motion of Mr. Parsons, the report was accepted and filed.

The secretary then read a communication from Mr. Ball relative to premiums claimed by Mr. R. B. Caruss.

On motion tabled.

President Fralick retired from the chair, and invited President-elect Parsons to preside.

President Parsons then announced the following committees:

Committee on Premiums—Wm. Ball, I. H. Butterfield, Jr., John Lessiter, W. H. Cobb, A. F. Wood, Geo. W. Phillips, H. O. Hanford.

Committee on Rules—Wm. Chamberlain, J. Q. A. Burrington, F. L. Reed, J. M. Sterling, C. W. Young.

Committee on Reception—Henry Fralick, J. L. Mitchell, W. J. Baxter.

Finance Committee—M. P. Anderson, D. W. Howard, E. W. Rising.

Transportation Committee—J. M. Sterling, W. L. Webber, W. J. Baxter.

Committee on Printing—A. J. Dean, J. C. Sterling, Abel Angel.

The committee then voted a recess until 3 o'clock P. M.

Afternoon Session.

The committee reassembled at 3 o'clock, President Parsons in the chair. Roll called, same members found present as at previous call.

Superintendent Hanford read the report of the Superintendents of Division I (Farm Implements), as follows:

DIVISION I—FARM IMPLEMENTS.

To the President and Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN,—The exhibition in the Farm Implement department of our last fair, was fully up to the standard of exhibits at our State fairs for a number of years past, both in quantity of implements on the ground and style of finish, as well as in improvements noted from year to year.

The whole number of entries was 472, divided among the several Classes as follows: Class 39, 78; Class 40, 57; Class 41, 49; Class 42, 141; Class 43, 81; Class 44, 66. As usual there were a large number of exhibitors who did not make their entries. Among the noted improvements (in Class 39) that have been made practical and are now coming into general use may be mentioned the Sulky Plow. The principal exhibitors of which were the Oliver Chilled Plow Company, the Gale Manufacturing Co., the South Bend Plow Co., the Wilder Plow Co., Deere & Co., the Moline Plow Co., Furst & Bradley, and several others. The improvements in harrows and cultivators (Class 40), have been quite extensive and valuable, and the exhibition large and exhaustive. The Acme harrow, the Rix harrow, the Spring-tooth harrow on wheels; the cultivator and seeder combined may be mentioned as the principal improvements made and exhibited by nearly every manufacturing company in and out of the State.

Seed drills, seeders, planters, etc., class 41, were shown in large numbers. The new features being the perfecting of the fertilizing attachments, called for by the growing wants of farmers of *this and other States* for phosphates and other artificial manures.

Great progress has been made in haying and harvesting machines (Class 42), in making them less complicated, and substituting twine for wire for bands in harvest.

ers with *equal*, if not greater success. Platform binders were shown by several firms, each claiming *perfect* work in the field, but many needed improvements will no doubt be made before they will be brought into general use.

Mowers and reapers are of lighter draught, combined machines are going out of use. Simple reapers and mowers are now made as separate machines, which are no doubt better adapted to the work to be performed. There was a large variety of hay rakes and feeders on the ground. Success seems to have attended the efforts of inventive genius to supply this want of the agriculturist. The heavy and unwieldy hay loader has been supplanted by a lighter draught and more practical machine.

Class 43 was well filled with a great variety of portable and traction engines, threshing machines, clover hullers, feed mills, straw and stalk cutters, fanning mills, wind mills, etc., etc., though all the machines run by wind were not confined to this department or placed on high derricks. Noted improvements have been made, and this class was an attractive feature of the fair. We had in class 44 the usual large display of dray and circular sawing machines, stump pullers, etc. W. S. Penfield, of Detroit, made a fine display of the smaller tools used on the farm, as well as feed cutters, grinders, etc., etc., and was unwearied in his efforts to make this department a success. Woodford & Niles, also of Detroit, made extra exertion to make their exhibit attractive, covering a platform 40 by 100 feet with the large assortment of tools of which they are agents.

To every exhibitor we are indebted for the kind consideration shown us during the fair. While all wanted the most desirable location, each took what was allotted them (when they could do no better).

We repeat that the exhibition was a great success, doing credit to the exhibitors, and honor to the society for their liberality to them. We have no suggestions for the future, unless we recommend that a covered building be provided for the shafting with a charge to each holder equal in two years to the expense of erection and maintenance. Until we establish some permanent location for the fair, it will be difficult for us to make our department as complete or systematically attractive as we would desire, but hope to see some improvement in the future.

Respectfully submitted,

H. O. HANFORD,
ABEL ANGEL,

Superintendents.

Mr. Fralick reported an unsettled account for boxing pictures, etc. Mr. A. J. Brow explained the charges, and, on motion of J. M. Sterling, the same was allowed and ordered paid.

Mr. Young presented the following, which was accepted and adopted and the thanks of the committee tendered the donors:

To the Executive Board Michigan State Agricultural Society:

GENTLEMEN—You may offer on your premium list for 1884, to be competed for at the annual fair, a special premium of one of our full-rigged three-horse "Economist" sulky plows, with reversable shares and revolving landside, keel frame and wheels, which shall be awarded by a committee of your selection to the farmer or farmer's son, resident of the State, who exhibits the best two bushels of wheat of his own raising.

The plow will be delivered by us to the winner of the premium on the fair grounds. Please advise us if you accept this offer, and oblige.

Yours very respectfully,

"ECONOMIST" PLOW CO.,

Per E. O. MEAGHER, *Sec'y.*

A communication from Mr. Stevens, of Detroit, recommending certain changes in the premium list for boots and shoes was read, and, upon motion, referred to the committee on premiums.

Mr. Whitney proffered tickets to his opera-house this evening to all members of the committee, which, on motion of Mr. George W. Phillips, was accepted with thanks.

Mr. Anderson, from the special committee appointed to consider the question of appropriating money to assist in defraying the expenses of a delegate to Washington to advocate a bill to prevent the spread of contagious diseases among cattle, offered the following:

To the President and Executive Committee of the Agricultural Society:

GENTLEMEN—Your committee, to whom was referred the matter of appropriating money from the funds of this society to defray the expense of sending the Hon. Wm. Ball as a delegate to Washington to influence, as far as possible, the passing of a bill to prevent the spread of contagious diseases among cattle, recommend as follows:

That the sum of three hundred (\$300) dollars be placed at his disposal as a fund to be drawn from as required. All of which is respectfully submitted.

M. P. ANDERSON,
Chairman.

H. O. HANFORD,
I. H. BUTTERFIELD, JR.,
GEO. W. PHILLIPS.

On motion of Mr. Reed, the report of the committee was accepted and adopted.

On motion of Mr. Burrington, a committee of three was appointed by the chair to confer with a like committee from the Horticultural Society in reference to that society's exhibiting with us at the next annual fair.

Committee: Messrs. Burrington, Sterling, and Rising.

Upon motion, the committee adjourned to meet Wednesday morning at 9 o'clock.

THIRD DAY.

RUSSELL HOUSE, }
Detroit, January 16th, 1884. }

The executive committee resumed its session this morning pursuant to adjournment, the president, Hon. Philo Parsons, in the chair.

Present—President Parsons, Treasurer Dean, Messrs. Sterling, Rising, Hanford, Ball, Lessiter, Cobb, Hyde, Reed, Smith, Burrington, Wood, Chamberlain, Angel, Howard, Young, Butterfield, Gilbert, Anderson, Baxter, Phillips, Fralick, and the secretary.

The special committee appointed to confer with the Horticultural Society reported as follows:

To the President and Executive Committee of the State Agricultural Society:

GENTLEMEN—Your committee appointed to confer with a committee of the State Horticultural Society would respectfully report that we recommend that we invite the said society to exhibit with us at the State fair of 1884, upon the same terms and conditions as last year, viz.: That we appropriate the sum of \$1,000 to be distributed in premiums and \$1,400 for expenses, or such amount, as limited by the foregoing sums, as the wants of the said society may require.

J. Q. A. BURRINGTON,
E. W. RISING,
J. M. STERLING,
Committee.

On motion of Mr. Wood, the report was accepted and adopted.

Mr. Reed moved to reconsider the vote taken yesterday, appropriating \$300 towards the expense of a delegate to Washington. Carried.

A lengthy discussion was held on the adoption of the report, and was participated in by Messrs. Chamberlain, Butterfield, Ball, Fralick, Anderson, Hanford, Cobb, and Hyde.

Mr. Chamberlain moved that the question be divided and a vote taken on that part appropriating \$300. The motion prevailed and the amount was voted.

It was then moved and supported to adopt the balance of the report. Carried.

The delegates from the State Horticultural Society, in the following letter, signified their acceptance of the invitation to exhibit with the society next fall:

To the Executive Committee of the State Agricultural Society :

GENTLEMEN—We, as authorized delegates from the Michigan Horticultural Society to confer with you concerning arrangements for a joint exhibit at the fair of 1884, hereby accept the invitation and details of arrangement as proposed this day at the morning session of your committee.

CHAS. W. GARFIELD,

Secretary.

EVART H. SCOTT,

Chairman Business Committee.

Detroit, January 16, 1884.

The president then announced the committee on so much of the presidents' addresses as relates to the location of the fair as follows: Messrs. Chamberlain, Hyde, Smith, Phillips, and Howard.

The committee then took a recess until 3 o'clock.

Afternoon Session.

The committee reassembled at the hour appointed.

Same members present as at morning session.

President Parsons read a communication from The E. T. Barnum Iron and Wire Works, inviting the executive committee to visit their works, and from President J. C. Holmes of the Detroit Scientific Association, inviting the committee to attend a lecture to be delivered before the association on Thursday evening.

The communications were laid on the table.

Mr. E. Haugh, representing Mr. Jacob Youngblood, presented the claim of that gentleman.

Upon motion, the matter was referred to a committee consisting of Messrs. J. M. Sterling, Wm. Ball, and W. J. Baxter, with power to settle the same.

The president then announced the following committee:

Business Committee—W. H. Cobb, A. O. Hyde, F. V. Smith.

On that part of the president's address relating to the Agricultural College and the establishment of an experimental station—I. H. Butterfield, Jr., F. L. Reed, C. W. Young, A. J. Dean, E. W. Rising.

On that part of the address relating to crop reports—Messrs. Wm. Ball, M. P. Anderson, and A. F. Wood.

President Abbot, of the State Agricultural College, was invited to address the committee. He first extended an invitation to the executive committee to

visit the college on the second Wednesday in June, and then delivered a few interesting remarks.

Mr. Butterfield offered the following, which was unanimously adopted :

WHEREAS, The presence of contagious pleuro-pneumonia in some of the Atlantic States does great injury to our foreign trade in cattle products, and is a constant menace to the great cattle interests of Michigan and other western States; and

WHEREAS, State action and individual efforts have failed up to the present time to eradicate or sufficiently control the disease, and believing that the complete eradication of this dangerous malady is the only method of restoring confidence to foreign customers and securing safety at home; therefore

Resolved, By the executive committee of the Michigan State Agricultural Society, that we urge upon the congress of the United States the immediate passage of efficient laws for this object, and we urge our senators and representatives in congress to use their votes and influence to this end.

On motion the secretary was instructed to send a copy of the above resolution to each member of the Michigan delegation in congress.

An invitation from Manager Shaw to attend the Detroit Opera House was accepted with thanks.

The communication from The E. T. Barnum's Iron and Wire Works, and from President Holmes, were taken from the table, and the invitations, on motion, accepted.

Mr. Burrington asked to be excused from further attendance.

On motion, granted.

The committee then adjourned until 9 o'clock Thursday morning.

FOURTH DAY.

RUSSELL HOUSE, }
 Detroit, January 17th, 1884. }

The executive committee met this morning as per adjournment, President Parsons in the chair.

Present—President Parsons, Treasurer Dean, Messrs. Sterling, Rising, Hanford, Ball, Lessiter, Cobb, Hyde, Reed, Smith, Burrington, Wood, Chamberlain, Angel, Howard, Young, Butterfield, Anderson, Shoemaker, Baxter, Phillips, Fralick, and the secretary.

On motion of Mr. Baxter, it was

Resolved, That it is the duty of every officer of the State Agricultural Society, and each member of the executive committee, to report forthwith to the president, or other proper officers, any violation of any rule or regulation of the society, either in letter or spirit, coming to his knowledge, and the duty of the president or officer in charge of the matter on which complaint arises at once to examine into the cause of complaint, and to enforce due observance of all the rules and regulations. In other words, an officer or committee man should speak at once when cognizant of the offense, or forever thereafter hold his peace.

The same gentleman then offered the following resolution, which was adopted :

WHEREAS, A vacancy has been made in the executive committee by the election of Hon. Philo Parsons, as president of the society—and inasmuch as it is desirable that all parts of the State should be represented on the committee; therefore

Resolved, That a committee of three be appointed to look over the present list of executive members and their location, with a view to ascertaining what, if any, portion of the State is not now represented, and that they recommend two or more suit-

able persons from portions of the State not now fully represented, from whom to select a member to fill the vacancy.

In accordance with the above resolution the president appointed as committee Messrs. Baxter, Fralick, and Phillips.

Mr. Baxter stated that since the last annual meeting of this committee Mr. G. C. Munro, one of the oldest members, had passed away, and moved that suitable resolutions be drawn with regard to the deceased.

The president then appointed as such committee Messrs. Shoemaker, Hyde, and Dean, who reported as follows:

WHEREAS, The executive committee of the State Agricultural Society of the State of Michigan has learned with great regret of the death of the Hon. George C. Munro, of Jonesville; therefore

Resolved, That by the death of Mr. Munro, the oldest living ex-President of this society, and for over thirty years a member of this committee, this society has lost one of its most worthy and valuable members. Mr. Munro was president of this society in 1854, when it was not only in its infancy, but was under such pecuniary difficulties as to make its continuance a matter of great doubt. Then and for some years its officers were called upon to sustain it with their individual responsibility, and in all these times of trial Mr. Munro not only cordially responded to every call made necessary by the wants of the society, but was always one of the first and foremost, both by his influence, his action, and his personal responsibility, to sustain the then feeble society, and to initiate those measures which have resulted in making it what it now is—a complete success and credit to the State.

Resolved, That a copy of the above resolution be signed by the president and secretary of this society and forwarded to the widow of Mr. Munro, with an assurance that in her great loss she has the sympathy of this executive committee.

M. SHOEMAKER,

A. O. HYDE,

A. J. DEAN,

Committee.

A rising vote was had and the resolution unanimously adopted.

The committee on nominations presented the names of Mr. Chandler, of Cheboygan, Mr. J. P. Shoemaker, of Amsden, Montcalm county, Perry Hannah, Grand Traverse, Mr. Seymour, of Sault Ste. Marie, and E. W. Cottrell, Detroit, and stated that the first four named gentlemen were residents of that part of the State lying north of Ingham county. This district had but nine representatives on the committee, while the portion of the State south of that line has twenty-four, and therefore recommend that one of these four be elected.

The report was accepted and it was moved and supported to proceed to the election of a member. Carried.

Mr. Dean and Mr. Young were appointed tellers.

The first ballot resulted in the election of Mr. Shoemaker.

The committee on premiums submitted the following:

To the Executive Committee of the Michigan State Agricultural Society:

The committee to whom was referred the revision of the premium list, the recommendations of the outgoing and incoming presidents, and the various suggestions made by executive superintendents, have had the same under consideration and fully considered the same. Some of the recommendations have been adopted; some partially. Others, after thorough discussion and with due regard to the opinions of these gentlemen, have been modified or changed; among which are the following:

From the fact that so many good cattle are shown in the various classes of live stock that receive no premiums, though highly meritorious, it has been thought best to retain the fourth premium in most instances, without increasing the amount of money offered. It is also in accordance with the wishes and desires of most breeders of the different breeds of cattle who exhibit, as expressed by those representing breeding associations.

The idea that is sometimes expressed that it encourages the exhibition of inferior

stock is not warranted by the large and good display of stock in the cattle department at least. In the class for aged cows in the Shorthorn class last fall, between thirty and forty head of cows were shown, the poorest of which was an ornament to any man's herd. And it was also true in degree in the Holstein and Jersey class and others. The above are some of the reasons which govern the committee in retaining the fourth premium. With reference to the recommendation, that competition be open to the world, your committee believe that while the term "open to the world" sounds magnanimous, and displays a liberality which meets much approval, still this is a State institution embracing a large and varied industry, and it seems to us that our first duty is to our own State and its exhibitors. With the large amount of good stock raised and exhibited in the various classes in the cattle department, the cost of preparing suitable accommodations and caring for them, and in order to better encourage the exhibition of stock owned in the State, it has been thought best in all classes of cattle, and nearly all in horses, all in sheep, swine, and poultry, except sweepstake prizes for cattle, that the exhibition be confined to the State. The sweepstake prizes on cattle alluded to are the head prizes of last year, with a slight increase of money. This increase, by some changes, is made without additional expense to this division.

The fears sometimes expressed that the exhibition will fail for want of meritorious animals and plenty of them, are without foundation as proved by the very creditable exhibitions of live stock from this State at our fairs in past years. The classes in horses excepted from the rule, are classes 16, 17, and 20 of last year, relating to draught horses and stallions with six of their get.

This statement with the report following is respectfully submitted, signed by entire committee.

WILLIAM BALL,
IRA H. BUTTERFIELD, JR.,
A. F. WOOD,
G. W. PHILLIPS,
JOHN LESSITER,
W. H. COBB,
H. O. HANFORD,

Committee on Premium List.

Mr. Baxter moved that all fourth premiums be stricken out, which, after a lengthy debate, was lost by the following vote:

Yeas—Sterling, Baxter, Fralick, President—4.

Nays—Rising, Hanford, Ball, Lessiter, Cobb, Hyde, Reed, Smith, Wood, Chamberlain, Angel, Young, Butterfield, Anderson, Shoemaker, Phillips, and Dean—17.

Mr. Baxter then moved to strike out all that part of the report confining the exhibition of stock to Michigan animals.

Yeas and *nays* were called for, and the motion carried by the following vote:

Yeas—Sterling, Rising, Hyde, Reed, Smith, Chamberlain, Howard, Young, Anderson, Shoemaker, Baxter, Fralick, Parsons, Dean—14.

Nays—Hanford, Ball, Lessiter, Cobb, Wood, Butterfield, Phillips—7.

It was then moved and supported that the report be referred back to the committee with instructions, that the rules changed be made to conform with those of last year.

It was then voted to take a recess till 3 o'clock P. M.

Afternoon Session.

The committee resumed business at 3 o'clock P. M., President Parsons in the chair, and a quorum present.

On motion of Mr. Fralick, a vote of thanks was extended to The E. T. Barnum Wire and Iron Works for courtesies extended.

Mr. Chamberlain, chairman of the committee on rules, presented the following report:

To the President and Executive Committee of the State Agricultural Society:

Your committee on rules beg leave to report that they have made a careful examination of the rules governing the society; have made some changes which have been suggested by the president and members of the committee, and submit them to you for your consideration.

WILLIAM CHAMBERLAIN,
F. L. REED,
C. W. YOUNG,
J. M. STERLING,
J. Q. A. BURRINGTON.

On motion of Mr. Ball, the report was taken up section by section, and the changes recommended voted upon singly.

By-law No. 5 was amended by adding (in reference to treasurer and secretary's bonds), "Which shall be deposited with the president for safe keeping."

By-law No. 11, amended by adding, "And no funds for any other purpose shall be drawn from the treasury of the society except upon a two-third yeas and nay vote of the members present."

Article VI (liquors), amended to read as follows: "No spirituous liquors or other intoxicating drinks of any kind, which shall include all malt liquors, lager beer, and wines, shall be allowed to be sold on the fair grounds during the fair."

Section 4, of article IX, was amended to read as follows:

SECTION 4. All entries in divisions A, B, C, and D shall be made on or before Tuesday evening of the week preceding the fair, and all entries of machinery and articles in division E, and in classes 39, 40, 41, 42, 43, and 44 of division I, and classes 46 and 47 in division K, must be made on or before Thursday evening of the week preceding the fair. All other articles must be entered and in their proper places on or before Monday, the first day of the fair.

The following substitute was offered for section 15 of article IX:

"For the convenience of exhibitors having exhibits which require their constant care and attention, and for renters of booths who require extra attendants, there will be furnished coupon tickets of five coupons each, price one dollar, which will be good for admission once each day during the fair. Said tickets to be issued at the discretion of the several superintendents in charge of the departments. The name of the party to whom issued, the exhibit or booth on account of which it is given. The name of superintendent in charge shall be endorsed on said tickets. A separate gate will be set apart for holders of these tickets, where they will be required to enter."

A rising vote was taken and the substitute adopted 11 to 4.

Section 1, of article XII, was amended to read as follows:

"Thursday, Friday, and Saturday previous to the fair, all parties desiring space in this department, must apply therefor to the superintendent, who shall furnish space and hold it open until 3 P. M., Saturday. If not occupied by that time will be vacated."

Section 3, of article XI, was amended to read as follows:

"Stalls, stables, and pens are provided for live stock. For the use of double stalls with doors a charge of \$1 will be made, and for single stalls with doors 50 cents will be charged; but where room cannot be made, then the superintendent may permit such animals to have admission to the grounds at such times as he may deem proper. Places may be assigned in the order of application. No loose animals shall remain on the grounds."

Rule 3 of special rules on cattle was amended to read as follows:

"Superintendent of division A shall be a special committee on pedigrees."

And the following was added to the general rules on live stock:

"The superintendent in division B, horses, C, sheep, and D, swine, shall be the committee on pedigrees in their respective departments."

Upon motion the report was adopted as a whole.

It was moved and supported that the executive officers and business committee be appointed a committee on location of next annual fair. Mr. Hyde moved to amend by adding the transportation committee.

The amendment prevailed, and the motion as amended adopted.

Committee then took a recess to 7:30 P. M.

Evening Session.

President Parsons called the committee to order at 7:30 o'clock.

Quorum present.

Mr. Hyde, from committee on permanent location offered the following:

To the President and Executive Members of the State Agricultural Society :

Your committee who were appointed to take into consideration the question of a permanent location for holding the State fair, report that they have had the subject under consideration, and, in the opinion of your committee, the best interests of the people of the State, and this Society, will be subserved by holding the fairs of the Society so they shall accommodate, as near as may be, all parts of the State. In view of this, we recommend that this Society shall take such action and make such arrangements with local societies that permanent grounds and buildings may be procured in suitable places in the State, where the Society may hold its fair for a limited period, as circumstances may require.

W. CHAMBERLAIN,
GEORGE PHILLIPS,
F. V. SMITH,
A. O. HYDE,

Committee.

Accepted and adopted.

Mr. Sterling, from the committee appointed to settle with Mr. Youngblood, reported verbally, \$25.00 paid and claim settled.

Report accepted and adopted.

On motion of J. M. Sterling,

Resolved, That the annual fair of 1884 be held commencing Monday, September 15th, and continuing five days.

The report of the committee on premiums was taken up and the changes from the list of 1883 recommended by the committee were voted upon and adopted separately.

The recommendation of the committee to strike out all premiums offered for Ayrshire cattle was adopted, after some debate.

On motion, the report of the committee was adopted as a whole.

On motion, it was voted to reconsider the vote adopting the report of the committee on rules.

Moved and supported, to instruct the committee on rules to change the rule fixing time for closing entries in division M to conform to rule reported by committee on premiums. Carried.

On motion of Mr. Ball, the following rule was adopted:

The gates and gatekeepers, and the tickets taken up at the gates, shall be under the direction and control of the superintendent of gates, who may make and cancel appointments of gatekeepers, and shall have an office at the grounds convenient to

the gates during fair. Gatekeepers shall not be appointed from persons residing nearer the place of holding the fair than fifty miles.

The report or committee on rules, as amended, was then adopted.

Mr. Ball offered the following, which was adopted unanimously.

Resolved, That the thanks of this executive committee are due to C. J. Whitney and C. A. Shaw for their kindness in extending an invitation to attend their very enjoyable entertainments, which were so highly prized and heartily enjoyed by said committee.

The committee on Agricultural College offered the following:

The committee on Agricultural College to whom was referred that portion of the president's address relating to an experimental station, have had the subject under consideration, and believe that the time has come in the history of the agriculture of the State, when an experimental station is demanded by the farmers of the State, and we heartily favor its establishment at the Agricultural College, in accordance with the suggestion of the president; and recommend that a committee of three be appointed by the president to more fully investigate this subject and prepare a suitable memorial to be presented to the next Legislature, asking for a suitable appropriation for this purpose.

It is also our clear conviction that a mechanical department should be added to the Agricultural College, according to the provision in the act of Congress granting public lands for the support of such colleges in the several States, and we recommend that in case the State Board of Agriculture ask an appropriation of the next Legislature for this purpose, that this board will lend them their influence and hearty support.

Your committee further recommend that fraternal relations be continued with the State Agricultural College, and that this executive committee accept the invitation of President Abbot to visit the College on the second Wednesday in June next.

IRA H. BUTTERFIELD, JR.,

C. W. YOUNG,

F. L. REED,

A. J. DEAN,

Committee on Agricultural College.

Adopted.

It was then moved and supported, that the secretary's salary be one thousand dollars (\$1,000) per annum, and that the treasurer be allowed a book-keeper at a salary of four hundred dollars (\$400) per annum.

The yeas and nays were called and the motion adopted unanimously, seven-teen votes being cast.

Moved and supported to take a recess to 9 o'clock Friday morning. Carried.

FIFTH DAY.

RUSSELL HOUSE, }
Detroit, January 18, 1884. }

Committee resumed business at 9 o'clock A. M., President Parsons in the chair.

Roll called.

Quorum present.

Mr. Anderson reported for the finance committee as follows:

To the President and Executive Committee of the State Agricultural Society:

The committee on finance, to whom was referred the secretary's report pertaining

to finance, beg leave to report that they have made a careful examination of the books and stubs, and found them to be correct as reported by him.

They further report that they have examined the bond of the secretary, and have approved the same. Said bond is deposited with the president.

M. P. ANDERSON,
D. W. HOWARD,
E. W. RISING,

Finance Committee.

To the President and Executive Committee of the State Agricultural Society:

Your committee on finance, appointed to settle with the treasurer, beg leave to report that they examined the vouchers and compared them with the proper stubs, and find the account as rendered by him to be correct.

M. P. ANDERSON,
D. W. HOWARD,
E. W. RISING,

Finance Committee.

To the President and Executive Committee of the State Agricultural Society:

Your committee on finance, to whom was referred the account of the business committee, beg leave to report that they have made a careful examination of the books, and find their account as rendered by them correct.

M. P. ANDERSON,
D. W. HOWARD,
E. W. RISING,

Finance Committee.

Upon motion the above reports were accepted and adopted.

The President then appointed the following committee and superintendents:

Programme Committee—Messrs. A. O. Hyde, F. V. Smith, and I. H. Butterfield, Jr.

General Superintendent—Geo. W. Phillips.

Chief Marshal—A. O. Hyde.

EXECUTIVE SUPERINTENDENTS.

Cattle—I. H. Butterfield, Jr.

Horses—F. V. Smith.

Sheep—D. W. Howard.

Swine—John Lessiter.

Poultry—J. Q. A. Burrington.

Fine Arts—W. J. Baxter.

Miscellaneous—Chas. W. Young.

Music—M. P. Anderson.

Children's Department—Miss Minnie H. Brow.

Needlework—Miss Minnie H. Brow.

Manufactures—J. L. Mitchell.

Agricultural—A. F. Wood.

Machinery—Wm. Chamberlain.

Farm Implements—H. O. Hanford and Abel Angel.

Dairy—E. W. Rising.

Bees and Honey—J. P. Shoemaker.

Vehicles—John Gilbert.

Forage—F. L. Reed.

Gates—Wm. Ball.

Police—J. M. Sterling and Wm. Ball.

Mr. Sterling asked to be excused from serving as superintendent of police, and Mr. W. H. Cobb was appointed in his stead.

On motion of Mr. Butterfield,

Resolved, That the locating committee for the next State fair be the committee on permanent location; and that they be instructed to locate the next fair with reference to making it one of the permanent locations of the society.

Mr. Ball offered the following:

Resolved, That the present locating committee, consisting of the president, secretary, and treasurer, transportation committee, and business committee, have power to advertise in such manner as they may determine for proposals from different localities, stating in said advertisements what such proposals should embrace; and with reference to locating the fair for one year or more, or permanently.

A lengthy debate was held on the subject of permanent location. Mr. C. W. Green, an ex-member, delivered a few very able remarks.

The resolution was adopted, and the committee adjourned *sine die*.

J. C. STERLING,
Secretary.

PHILO PARSONS,
President.

OFFICIAL LIST OF PREMIUMS AWARDED AT THE THIRTY-FIFTH ANNUAL FAIR OF THE SOCIETY, HELD AT DETROIT, SEPTEMBER 17 TO 21, 1883.

DIVISION A—CATTLE.

CLASS 1—SHORTHORNS.

Best bull, four years old or over, L. L. Brooks, Novi, Mich.....	\$25 00
2d do., C. L. Blanchard, Morenci, Mich.....	20 00
3d do., Phelps Bros., Dexter, Mich.....	15 00
4th do., R. A. Remick, Clarkston, Mich.....	10 00
Best bull, three years old, A. P. Cook, Brooklyn, Mich.....	20 00
2d do., Wm. Ball, Hamburg, Mich.....	15 00
3d do., Merchant Kelly, Kelly's Corners, Mich.....	10 00
Best bull, two years old, A. F. Wood, Mason, Mich.....	20 00
2d do., A. S. Brooks, Wixom, Mich.....	15 00
3d do., Merchant Kelly, Kelly's Corners, Mich.....	10 00
Best bull, one year old, W. C. Boyden, Delhi Mills, Mich.....	15 00
2d do., W. C. Wixom, Wixom, Mich.....	10 00
3d do., A. Hosner, N. Farmington, Mich.....	5 00
4th do., James Moore, Milford, Mich.....	3 00
Best bull calf, 6 months and under one year, L. L. Brooks, Novi, Mich.....	10 00
2d do., James Moore, Milford, Mich.....	8 00
3d do., A. F. Wood, Mason, Mich.....	5 00
4th do., D. McOmber, Hastings, Mich.....	3 00
Best bull calf, under six months old, A. D. DeGarmo, Highland Station, Mich.....	6 00
2d do., Wm. Ball, Hamburg, Mich.....	4 00
3d do., James Moore, Milford, Mich.....	2 50
4th do., Oscar Easton, Dexter, Mich.....	1 50
Best cow, four years old or over, Oscar Easton, Dexter, Mich.....	25 00
2d do., A. D. DeGarmo, Highland Station, Mich.....	20 00
3d do., James Moore, Milford, Mich.....	15 00
4th do., A. D. DeGarmo, Highland Station, Mich.....	10 00
Best cow, three years old, Wm. Ball, Hamburg, Mich.....	20 00
2d do., Wm. Ball, Hamburg.....	15 00
3d do., D. McOmber, Hastings.....	10 00
4th do., W. C. Wixom, Wixom.....	5 00
Best heifer, two years old, Wm. Ball, Hamburg.....	20 00
2d do., A. D. DeGarmo, Highland Station.....	15 00
3d do., Oscar Easton, Dexter.....	10 00
4th do., W. V. Boyden, Delhi Mills.....	5 00
Best heifer, one year old, Wm. Ball, Hamburg.....	15 00
2d do., A. P. Cook, Brooklyn.....	10 00
3d do., W. C. Wixom, Wixom.....	5 00
4th do., Phelps Bros., Dexter.....	3 00

Best heifer calf, six months and under one year, O. Snow & Son, Kalamazoo	\$10 00
2d do., Phelps Bros., Dexter	8 00
3d do., Phelps Bros., Dexter	5 00
4th do., J. S. Flint, Somerset	3 00
Best heifer calf, under six months old, J. S. Flint, Somerset	6 00
2d do., A. P. Cook, Brooklyn	4 00
3d do., A. S. Brooks, Wixom	2 50
4th do., James Moore, Milford	1 50
Best herd Shorthorns, Wm. Ball, Hamburg	30 00
2d do., W. C. Wixom, Wixom	25 00
3d do., W. E. Boyden, Delhi Mills	20 00
4th do., A. D. DeGarmo, Highland Station	15 00
5th do., Phelps Bros., Dexter	10 00
Best Shorthorn bull, and four of his get, owned and bred in Michigan, Phelps Bros., Dexter	20 00
2d do., O. Snow & Son, Kalamazoo	12 00
3d do., D. McOmber, Hastings	8 00

WM. STOCKING,
ROBT. MILLER,
R. BAKER,

Judges.

CLASS 2—DEVONS.

Best bull, four years old or over, E. T. Doney, Jackson	\$25 00
Best bull, three years old, A. J. Burrows, Troy	20 00
Best bull, two years old, Leech & Walker, Utica	20 00
Best bull, one year old, Leech & Walker, Utica	15 00
2d do., D. R. Bixby, Disco	10 00
Best bull calf, six months and under one year, A. J. Burrows, Troy	6 00
Best bull calf, under six months old, E. T. Doney, Jackson	6 00
2d do., Leech & Walker, Utica	4 00
3d do., Leech & Walker, Utica	2 50
Best cow, four years old or over, Leech & Walker, Utica	25 00
2d do., Leech & Walker, Utica	20 00
3d do., A. J. Burrows, Troy	15 00
Best cow, three years old, Leech & Walker, Utica	20 00
2d do., E. T. Doney, Jackson	15 00
3d do., E. T. Doney, Jackson	10 00
Best heifer, two years old, Leech & Walker, Utica	20 00
2d do., Leech & Walker, Utica	15 00
3d do., D. R. Bixby, Disco	10 00
Best heifer one year old, A. J. Burrows, Troy	15 00
2d do., Leech & Walker, Utica	10 00
3d do., E. T. Doney, Jackson	5 00
Best heifer calf six months, and under one year, A. J. Burrows, Troy	6 00
2d do., E. T. Doney, Jackson	4 00
Best heifer calf under six months, Leech & Walker, Utica	6 00
2d do., D. R. Bixby, Disco	4 00
Best herd of Devons, Leech & Walker, Utica	25 00
2d do., A. J. Burrows, Troy	15 00
3d do., D. R. Bixby, Disco	10 00

WM. STOCKING,
RUFUS PIERSON,
R. BAKER,

Judges.

CLASS 3—HEREFORDS.

Best bull four years old or over, Wm. Hamilton, Flint	\$25 00
2d do., Thos. Foster, Flint	20 00
3d do., Edwin Phelps, Pontiac	15 00
Best bull one year old, Thos. Foster, Flint	15 00
2d do., Thos. Foster, Flint	10 00
3d do., Edwin Phelps, Pontiac	5 00
Best bull calf six months, and under one year, Wm. Hamilton, Flint	6 00
2d do., Thomas Foster, Flint	4 00

Best bull calf under six months old, Wm. Hamilton, Flint.....	\$6 00
2d do., Edwin Phelps, Pontiac.....	4 00
3d do., Thomas Foster, Flint.....	2 50
Best cow four years old or over, Wm. Hamilton, Flint.....	25 00
2d do., Wm. Hamilton, Flint.....	20 00
3d do., State Agricultural College, Lansing.....	15 00
Best cow three years old, Wm. Hamilton, Flint.....	20 00
2d do., Thos. Foster, Flint.....	15 00
3d do., Thos. Foster, Flint.....	10 00
Best heifer two years old, Wm. Hamilton, Flint.....	20 00
2d do., Wm. Hamilton, Flint.....	15 00
3d do., Edwin Phelps, Pontiac.....	10 00
Best heifer one year old, Edwin Phelps, Pontiac.....	15 00
2d do., Thos. Foster, Flint.....	10 00
3d do., Wm. Hamilton, Flint.....	5 00
Best heifer calf six months, and under one year, Edwin Phelps, Pontiac....	6 00
2d do., Edwin Phelps, Pontiac.....	4 00
3d do., Edwin Phelps, Pontiac.....	2 50
Best heifer calf under six months old, Thos. Foster, Flint.....	6 00
2d do., Wm. Hamilton, Flint.....	4 00
3d do., Thos. Foster, Flint.....	2 50
Best herd of Herefords, Wm. Hamilton, Flint.....	25 00
2d do., Thos. Foster, Flint.....	15 00
3d do., Edwin Phelps, Pontiac.....	10 00

L. L. BROOKS,
G. W. PHILLIPS,
ROBT. MILLER,

Judges.

CLASS 4—AYRSHIRES.

Best bull four years old or over, Ormiston & Jardine, Cuba, N. Y.....	\$25 00
Best bull three years old, State Agricultural College, Lansing.....	20 00
Best bull two years old, Ormiston & Jardine, Cuba, N. Y.....	20 00
Second best bull one year old, Ormiston & Jardine, Cuba N. Y.....	10 00
Best bull calf six months, and under one year, Ormiston & Jardine, Cuba, N. Y.....	6 00
Best bull calf under six months old, Ormiston & Jardine, Cuba, N. Y.....	6 00
Best cow four years old or over, Ormiston & Jardine, Cuba, N. Y.....	25 00
2d do., Ormiston & Jardine, Cuba, N. Y.....	20 00
3d do., Ormiston & Jardine, Cuba, N. Y.....	15 00
Best cow three years old, State Agricultural College, Lansing.....	20 00
Best heifer two years old, Ormiston & Jardine, Cuba, N. Y.....	20 00
2d do., State Agricultural College, Lansing.....	15 00
3d do., State Agricultural College, Lansing.....	10 00
Best heifer one year old, Ormiston & Jardine, Cuba, N. Y.....	15 00
2d do., State Agricultural College, Lansing.....	10 00
3d do., Ormiston & Jardine.....	5 00
Best heifer calf under six months old, Ormiston & Jardine, Cuba, N. Y....	6 00
Best herd of Ayrshires, Ormiston & Jardine, Cuba, N. Y.....	25 00

W. J. G. DEAN,
MARK SEELEY,

Judges.

CLASS 5—JERSEYS.

Best bull four years old or over, M. L. Frink, Oxford.....	\$25 00
2d do E. T. Kent, Grand Ledge.....	20 00
3d do., F. V. Smith, Coldwater.....	15 00
4th do., F. V. Smith, Coldwater.....	10 00
Best bull three years old, L. Kingston, Tekonska.....	20 00
2d do., E. S. Snow, Dearborn.....	15 00
3d do., Bates & Martin, Grand Rapids.....	10 00
4th do., Joel Chaffee, Greenfield.....	5 00
Best bull two years old, Isaac Marston, Detroit.....	20 00

Best bull one year old, G. B. Smith, Eagle.....	\$15 00
2d do., G. M. & E. O. Dewey, Owosso.....	10 00
3d do., F. V. Smith, Coldwater.....	5 00
4th do., Bates & Martin, Grand Rapids.....	3 00
Best bull calf under six months old, F. V. Smith, Coldwater.....	6 00
2d do., M. L. Frink, Oxford.....	4 00
3d do., Isaac Marston, Detroit.....	2 50
Best cow four years old or over, Bates & Martin, Grand Rapids.....	25 00
2d do., Bates & Martin, Grand Rapids.....	20 00
3d do., F. V. Smith, Coldwater.....	15 00
4th do., Isaac Marston, Detroit.....	10 00
Best cow three years old, Isaac Marston, Detroit.....	20 00
2d do., Isaac Marston, Detroit.....	15 00
3d do., F. V. Smith, Coldwater.....	10 00
Best heifer two years old, G. B. Smith, Eagle.....	20 00
2d do., M. L. Frink, Oxford.....	15 00
3d do., M. L. Frink, Oxford.....	10 00
4th do., Isaac Marston, Detroit.....	5 00
Best heifer one year old, Bates and Martin, Grand Rapids.....	15 00
2d do., M. L. Frink, Oxford.....	10 00
3d do., G. B. Smith, Eagle.....	5 00
4th do., Isaac Marston, Detroit.....	3 00
Best heifer calf six months, and under one year, G. B. Smith, Eagle.....	10 00
2d do., M. L. Frink, Oxford.....	8 00
3d do., F. V. Smith, Coldwater.....	5 00
4th do., F. V. Smith, Coldwater.....	3 00
Best heifer calf under six months old, M. L. Frink, Oxford.....	6 00
2d do., Isaac Marston, Detroit.....	4 00
3d do., Isaac Marston, Detroit.....	2 50
4th do., F. V. Smith, Coldwater.....	1 50

V. BARBER,

Judge.

Best herd of Jerseys, Isaac Marston, Detroit.....	\$30 00
2d do., G. B. Smith, Eagle.....	25 00
3d do., Bates and Martin, Grand Rapids.....	20 00
4th do., M. L. Frink, Oxford.....	15 00
5th do., F. V. Smith, Coldwater.....	10 00
Best Jersey bull, with four of his get, bred and owned in Michigan, M. L. Frink, Oxford.....	20 00
2d do., Isaac Marston, Detroit.....	12 00
3d do., F. V. Smith, Coldwater.....	8 00

A. J. CLARK,

E. W. COTRELL,

Judges.

Best herd of Guernseys, C. H. Gibbs, Pontiac.....	\$25 00
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CLASS 6—GALLOWAYS AND POLLED ANGUS.

Best bull three years old, R. B. Caruss, St. Johns.....	\$20 00
Best bull calf six months, and under one year, Geo. Hendrie, Detroit.....	6 00
Best bull calf under six months, Geo. Hendrie, Detroit.....	6 00
2d do., R. B. Caruss, St. Johns.....	4 00
Best cow four years old or over, R. B. Caruss, St. Johns.....	25 00
Best cow three years old, Geo. Hendrie, Detroit.....	20 00
2d do., R. B. Caruss, St. Johns.....	15 00
3d do., R. B. Caruss, St. Johns.....	10 00
Best heifer two years old, Geo. Hendrie, Detroit.....	20 00
2d do., Geo. Hendrie, Detroit.....	15 00
3d do., R. B. Caruss, St. Johns.....	10 00
Best heifer calf six months and under one year, R. B. Caruss, St. Johns.....	6 00
Best heifer calf under six months old, R. B. Caruss, St. Johns.....	6 00
Best herd of Galloways, R. B. Caruss.....	25 00

WM. STOCKING,

DAVID CLARK,

R. BAKER,

Judges.

CLASS 7—HOLSTEIN OR DUTCH FRIESIANS.

Best bull four years old or over, Wm. A. Rowley, Mt. Clemens.....	\$25 00
2d do., E. R. Phillips, Bay City.....	20 00
3d do., E. P. Campbell, Monroe.....	15 00
4th do., J. T. Sutton, Hillsdale.....	10 00
2d best bull three years old, Bruce Phillips, Utica.....	15 00
Best bull two years old, Fred Kerner, Mt. Clemens.....	20 00
2d do., Stone and Biggs, Hastings.....	15 00
3d do., R. G. Washburn, Litchfield.....	10 00
Best bull one year old, Bruce Phillips, Utica.....	15 00
2d do., J. M. Sterling, Monroe.....	10 00
3d do., Chas. Wilcox, Irving.....	5 00
Best bull calf six months, and under one year, E. P. Campbell, Monroe.....	10 00
2d do., Stone and Biggs, Hastings.....	8 00
3d do., E. R. Phillips, Bay City.....	5 00
4th do., J. M. Sterling, Monroe.....	3 00
Best bull calf under six months old, R. G. Washburn, Litchfield.....	6 00
2d do., Stone and Biggs, Hastings.....	4 00
3d do., Wm. McEwan, Bay City.....	2 50
4th do., Bruce Phillips, Utica.....	1 50
Best cow four years old or over, Wm. A. Rowley, Mt. Clemens.....	25 00
2d do., Stone and Biggs, Hastings.....	20 00
3d do., R. P. Gustin, Bay City.....	15 00
4th do., R. G. Washburn, Litchfield.....	10 00
Best heifer two years old, Wm. A. Rowley, Mt. Clemens.....	20 00
2d do., Stone and Biggs, Hastings.....	15 00
3d do., Wm. A. Rowley, Mt. Clemens.....	10 00
4th do., E. R. Phillips, Bay City.....	5 00
Best heifer one year old, J. M. Sterling, Monroe.....	15 00
2d do., Bruce Phillips, Utica.....	10 00
3d do., E. R. Phillips, Bay City.....	5 00
4th do., Stone and Biggs, Hastings.....	3 00
Best heifer calf six months, and under one year, E. P. Campbell, Monroe.....	10 00
2d do., J. M. Sterling, Monroe.....	8 00
3d do., E. R. Phillips, Bay City.....	5 00
4th do., Stone and Biggs, Hastings.....	3 00
Best heifer calf under six months old E. R. Phillips, Bay City.....	6 00
2d do., Wm. McEwan, Bay City.....	4 00
3d do., J. M. Sterling, Monroe.....	2 50
Best herd of Holsteins or Dutch Friesians, Wm. A. Rowley, Mt. Clemens.....	30 00
2d do., J. M. Sterling, Monroe.....	25 00
3d do., E. R. Phillips, Bay City.....	20 00
4th do., Stone and Biggs, Hastings.....	15 00
5th do., E. P. Campbell, Monroe.....	10 00

JAMES BIRNEY,

WALTER J. G. DEAN,

MARK SEELEY,

Judges.

CLASS 8—GRADE CATTLE.

Best cow, four years old or over, R. A. Remick, Clarkston.....	\$25 00
2d do., A. Hosner, North Farmington.....	20 00
3d do., David Miller, Clarkston.....	15 00
4th do., Wm. Hamilton, Flint.....	10 00
Best cow, three years old, A. Hosner, North Farmington.....	20 00
2d do., David Miller, Clarkston.....	15 00
3d do., R. A. Remick, Clarkston.....	10 00
4th do., A. P. Cook, Brooklyn.....	5 00
Best heifer, two years old, A. P. Cook, Brooklyn.....	20 00
2d do., R. A. Remick, Clarkston.....	15 00
3d do., O. Snow & Son, Kalamazoo.....	10 00
4th do., David Miller, Clarkston.....	5 00
Best heifer, one year old, A. Hosner, North Farmington.....	15 00
2d do., David Miller, Clarkston.....	10 00
3d do., R. A. Remick, Clarkston.....	5 00
4th do., A. Hosner, North Farmington.....	3 00

Best heifer calf, R. A. Remick, Clarkston.....	\$12 00
2d do., J. F. Sutfon, Hillsdale.....	8 00
3d do., David Miller, Clarkston.....	5 00
4th do., A. P. Cook, Brooklyn.....	3 00

MERCHANT KELLEY,
W. E. BOYDEN,
A. H. CANFIELD,

Judges.

CLASS 9—WORKING OXEN AND STEERS.

Best yoke of working oxen, four years old or over, Edward McGunegh, Clarkston.....	\$20 00
2d do., Thos. Foster, Flint.....	15 00
3d do., A. Hosner, North Farmington.....	10 00
Best yoke of steers, three years old, Oscar Cline, Sherwood.....	15 00
Best yoke of steers, two years old, C. L. Blanchard, Morenci.....	10 00
2d do., Geo. J. Townley & Son, East Springport.....	6 00
Best yoke of steers, one year old, C. S. Brooks, Brighton.....	8 00
2d do., David Miller, Clarkston.....	5 00

EDWIN PHELPS,
H. T. PHELPS,
P. A. CONNER,

Judges.

CLASS 10—FAT CATTLE.

Best steer, three years old and under four, E. Coon, Marion, Ohio.....	\$20 00
Best steer, two years old, A. Hosner, North Farmington.....	15 00
2d do., A. Hosner, North Farmington.....	10 00
3d do., Geo. J. Townley & Son, East Springport.....	6 00
Best steer, one year old, Thos. Foster, Flint.....	12 00
2d do., Thos. Foster, Flint.....	8 00
3d do., A. Hosner, North Farmington.....	5 00
Best heifer, three years old, and under four, W. E. Boyden, Delhi Mills.....	15 00
2d do., John Lessiter, Jersey.....	10 00
3d do., John Lessiter, Jersey.....	6 00
Best heifer, two years old, A. Hosner, North Farmington.....	12 00
2d do., Geo. J. Townley & Son, East Springport.....	8 00
Best herd of fat cattle, A. Hosner, North Farmington.....	25 00
2d do., Geo. J. Townley & Son, East Springport.....	15 00
Best fat steer, under four years old, showing greatest weight for age in days, Geo. J. Townley & Son, East Springport.....	20 00
2d do., E. Coon, Marion, Ohio.....	12 00

ROBT. MILLER,
JOHN JOHNSTONE,

Judges.

DIVISION B—HORSES.

CLASS 12—HORSES OF ALL WORK.

Best stallion, five years old or over, Ed. H. Lyon, St. Johns.....	\$25 00
2d do., Door Prairie Stock Breeders' Association, Door Village, Ind....	20 00
3d do., Donald Merrison, Sarnia, Ont.....	15 00
4th do., D. L. DeKay, Utica.....	10 00
Best stallion, four years old, Door Prairie Stock Breeders' Association, Door Village, Ind.....	20 00
2d do., James Pickering, Essex Center, Ont.....	15 00
3d do., D. & J. P. Fischer, Goodrich, Ont.....	10 00
4th do., David Plowman, DeWitt.....	5 00
Best stallion, three years old, D. & J. P. Fischer, Goodrich, Ont.....	20 00
2d do., H. T. Warren, St. Johns.....	15 00
3d do., L. M. Lyon, St. Johns.....	10 00
Best stallion, two years old, James Gibson, DeWitt.....	12 00
2d do., J. M. Thorrington, Romeo.....	10 00
3d do., D. & J. P. Fischer, Goodrich, Ont.....	8 00

Best stallion, one year old, D. & J. P. Fischer, Goodrich, Ont.....	\$10 00
2d do., S. A. Browne, Kalamazoo.....	8 00
3d do., Chas. Travis, St. Johns.....	5 00
Best stallion colt, R. P. Gustin, Bay City.....	8 00
2d do., J. D. Perry, Redford.....	5 00
3d do., Chas. Travis, St. Johns.....	3 00
Best brood mare, four years or over, with foal by side, J. D. Perry, Redford.....	10 00
Best mare, four years old or over, without colt, J. C. Chilson, Livonia.....	12 00
2d do., B. D. Taggart, Romeo.....	8 00
3d do., Moore & Kelly, Ypsilanti.....	5 00
Best mare, three years old, J. C. Chilson, Livonia.....	10 00
2d do., Benj. Miller, South Riley.....	8 00
Best filly, two years old, Patrick Millet, Howell.....	8 00
2d do., Geo. Braidwood, Almont.....	5 00
3d do., Benj. Miller, South Riley.....	3 00
Best filly, one year old, H. Walker & Son, Walkerville, Ont.....	7 00
2d do., Chas. Travis, St. Johns.....	5 00
Best gelding, four years old, Davenport & Curtis, Grass Lake.....	12 00
2d do., R. B. McCabe, St. Johns.....	8 00
3d do., J. D. Perry, Redford.....	5 00
Best gelding, two years old, James Besley, St. Johns.....	8 00
2d do., H. Walker & Sons, Walkerville, Ont.....	5 00
Best pair matched horses, five years or over, Smith & Parks, Grass Lake.....	30 00
2d do., Isadore Hendricks, Troy.....	20 00
3d do., H. Walker & Sons, Walkerville, Ont.....	10 00
Best pair matched horses, four years old, E. D. Barnes, Gaines Station.....	25 00

ROBT. MILLER,
H. N. BIDELMAN,
C. SELFRIDGE,

Judges.

CLASS 13—ROADSTERS.

Best stallion, five years old or over, S. A. Browne, Kalamazoo.....	\$30 00
2d do., James Perry, Mt. Clemens.....	20 00
3d do., B. D. Taggart, Romeo.....	10 00
Best stallion, four years old, A. L. Smith, Girard.....	25 00
2d do., Mitchell & Bolton, Leslie.....	15 00
3d do., A. B. Donelson, Pontiac.....	10 00
Best stallion, three years old, A. C. Fiske, Coldwater.....	20 00
2d do., James Perry, Mt. Clemens.....	15 00
3d do., A. G. Dewey, Pontiac.....	10 00
Best gelding, five years old or over, J. C. Deyo, Jackson.....	15 00
Best gelding, four years old, J. C. Deyo, Jackson.....	12 00
2d do., Davenport & Curtis, Grass Lake.....	8 00
Best gelding, three years old, G. W. Bell, Brockway Center.....	10 00
2d do., S. A. Browne, Kalamazoo.....	6 00
3d do., John Curry, Inkster.....	4 00
Best mare, four years old or over, without colt, B. W. Burnell, Coldwater.....	12 00
2d do., Mitchell & Bolton, Leslie.....	8 00
3d do., H. F. Warren, St. Johns.....	5 00
Best mare, three years old, Warren & Dewey, Coldwater.....	10 00
2d do., A. C. Fiske, Coldwater.....	6 00
3d do., John Hardenbergh, Farmington.....	4 00

JOHN R. CHAMPION,
S. A. COLBY,

Judges.

CLASS 14—BREEDERS' STOCK.

Best stallion, two years old, F. B. Galbraith, Pontiac.....	\$12 00
2d do., C. D. Childs, Parksville.....	8 00
3d do., R. A. Remick, Clarkston.....	5 00
Best stallion, one year old, S. A. Browne, Kalamazoo.....	10 00
2d do., E. T. Doney, Jackson.....	6 00
3d do., J. Bassett, Detroit.....	4 00
Best stallion colt, E. T. Doney, Jackson.....	7 00
2d do., S. A. Browne, Kalamazoo.....	5 00

Best brood mare, four years old or over, with foal by side, S. A. Browne, Kalamazoo.....	\$20 00
2d do., E. T. Doney, Jackson.....	15 00
Best filly, two years old, S. A. Browne, Kalamazoo.....	8 00
2d do., S. A. Browne, Kalamazoo.....	5 00
3d do., James Cooper, Birmingham.....	3 00
Best filly, one year old, S. A. Browne, Kalamazoo.....	7 00
2d do., Chas. Travis, St. Johns.....	5 00
3d do., S. A. Browne, Kalamazoo.....	2 00
Best filly colt, S. A. Browne, Kalamazoo.....	5 00

ROBT. MILLER,
H. N. BIDELMAN,
Judges.

CLASS 15—GENTLEMEN'S DRIVING HORSES TO ROAD WAGON.

Best pair driving horses, J. W. Hewitt, Jackson.....	\$30 00
2d do., J. C. Deyo, Jackson.....	20 00
3d do., Wm. Kennedy, Farmington.....	10 00
Best mare or gelding, five years old or over, A. E. Bush, Detroit.....	30 00
2d do., C. P. Toll, Detroit.....	20 00
3d do., S. B. Browne, Kalamazoo.....	10 00
Best mare or gelding, four years old, E. A. Collins, Homer.....	20 00
2d do., Davenport & Curtis, Grass Lake.....	15 00
3d do., S. A. Browne, Kalamazoo.....	10 00

JOHN R. CHAMPION,
Judge.

CLASS 16—DRAUGHT HORSES.

Best stallion, five years old or over, Hartung & Taggart, Romeo.....	\$30 00
2d do., Mitchell & Bolton, Leslie.....	20 00
3d do., Wm. Sadler, Galt, Ont.....	10 00
Best stallion, four years old, S. A. Barnes, Charlotte.....	25 00
2d do., Robt. Miller, Elmwood.....	15 00
Best stallion, three years old, E. G. Rust, Saginaw.....	20 00
2d do., E. B. Hall & Bro., Ann Arbor.....	12 00
3d do., Door Prairie Live Stock Association, Door Village, Ind.....	8 00
Best stallion, two years old, Mitchell & Bolton, Leslie.....	10 00
2d do., D. & J. P. Fisher, Goodrich, Ont.....	6 00
3d do., E. H. Hargrave & Son, Bay City.....	4 00
Best stallion, one year old, D. & J. P. Fisher, Goodrich, Ont.....	8 00
2d do., D. & J. P. Fisher, Goodrich, Ont.....	5 00
3d do., S. Crumpacker & Co., Westville, Ind.....	3 00
Best stallion colt, A. K. & C. H. Tooley, Howell.....	5 00
2d do., H. Walker & Sons, Walkerville, Ont.....	3 00
3d do., A. K. & C. H. Tooley, Howell.....	2 00
Best mare, four years old or over, Geo. Parrott, Mt. Clemens.....	20 00
2d do., S. Crumpacker & Co., Westville, Ind.....	12 00
3d do., Door Prairie Live Stock Association, Door Village, Ind.....	8 00
Best mare, three years old, Geo. Braidwood, Almont.....	12 00
2d do., Door Prairie Live Stock Association, Door Village, Ind.....	8 00
3d do., W. H. Louks, Lapeer.....	5 00
Best mare or gelding, two years old, Geo. Parrott, Mt. Clemens.....	10 00
2d do., N. J. Ellis, Springfield.....	6 00
3d do., Geo. Braidwood, Almont.....	4 00
Best mare, one year old, D. & J. P. Fisher, Goodrich, Ont.....	8 00
2d do., Geo. Parrott, Mt. Clemens.....	5 00
3d do., H. Walker & Sons, Walkerville, Ont.....	3 00
Best filly colt, H. Walker & Sons, Walkerville, Ont.....	5 00
Best pair of mares or geldings, five years old or over, Hendrie & Co., Detroit.....	30 00
2d do., W. H. Louks, Lapeer.....	20 00
3d do., H. Walker & Sons, Walkerville, Ont.....	10 00

C. SELFRIDGE,
H. N. BIDELMAN,
ROBT. MILLIKIN,
Judges.

CLASS 17—CARRIAGE AND BUGGY HORSES.

Best pair matched carriage horses, 16 hands or over, and five years old or over, A. B. Donelson, Pontiac.....	\$30 00
2d do., J. M. Paul & Co., Battle Creek.....	20 00
3d do., Thomas Grow, Pontiac.....	10 00
Best matched carriage horses, sixteen hands or over, and four years old, Wm. S. Harris, Homer.....	25 00
2d do., Jas. L. Edson, Detroit.....	15 00
Best pair matched carriage horses, under sixteen hands, and four years old or over, S. A. Browne, Kalamazoo.....	25 00
2d do., I. J. Nelson, Howell.....	15 00
3d do., John Terpenning, Addison.....	10 00
Best pair matched carriage horses, three years old, Geo. H. German, Farmington.....	20 00
Best single carriage or buggy horse, four years old or over, J. M. Paul & Co., Battle Creek.....	12 00
2d do., R. A. Remick, Clarkston.....	8 00
3d do., H. Courtright, Detroit.....	4 00
Best single carriage or buggy horse, three years old, John Fikes, Fenton.....	10 00
2d do., H. E. Cady, Northville.....	7 00
3d do., R. A. Remick, Clarkston.....	3 00

L. M. WING,
S. A. COLBY,
JOHN R. CHAMPION,

Judges.

CLASS 18—MICHIGAN HORSES, ROADSTERS AND THOROUGHBRED STALLIONS.

Best stallion, five years old or over, S. A. Browne, Kalamazoo.....	\$100 00
2d do., A. I. Perrin, Parkville.....	75 00
3d do., A. B. Donelson, Pontiac.....	50 00
Best stallion, four years old, L. C. Field, Mendon.....	75 00
2d do., Warren & Dewey, Coldwater.....	50 00
3d do., H. L. Wixom, Coldwater.....	25 00
Best stallion, three years old, A. C. Fisk, Coldwater.....	30 00
2d do., Henry Rose, Schoolcraft.....	20 00
3d do., H. E. Cady, Northville.....	10 00
Best stallion, two years old, S. A. Browne, Kalamazoo.....	20 00
2d do., A. W. Van Loghan, Kalamazoo.....	15 00

JOHN R. CHAMPION,
S. A. COLBY,
L. M. WING,

Judges.

CLASS 19—MICHIGAN HORSES, ROADSTERS AND THOROUGHBRED MARES AND GELDINGS.

Best mare or gelding, five years old or over, A. C. Fisk, Coldwater.....	\$100 00
2d do., D. N. Tripp, Coldwater.....	75 00
3d do., Martin Axford, Mt. Clemens.....	50 00
Best mare or gelding, four years old, E. A. Collins, Homer.....	75 00
2d do., Arthur Atridge, Colon.....	50 00
3d do., S. A. Browne, Kalamazoo.....	25 00
Best mare or gelding, three years old, A. C. Fisk, Coldwater.....	30 00
2d do., H. L. Wixom, Coldwater.....	20 00
3d do., S. A. Browne, Kalamazoo.....	10 00
Best mare or gelding, two years old, F. Richardson, Coldwater.....	20 00
2 do., Lafayette Ulrich, Mendon.....	15 00
3d do., A. I. Perrin, Parkville.....	10 00

JOHN R. CHAMPION,
L. M. WING,
S. A. COLBY,

Judges.

CLASS 19½—MICHIGAN HORSES, STALLIONS, MARES, AND GELDINGS, UNDER SADDLE.

Best mare or gelding, any age over three years, C. B. Hooper, Southfield.....	\$50 00
2d do., Chas. Burnham, Fulton	30 00
3d do., J. L. Barry, Midland.....	20 00

JOHN R. CHAMPION,
L. M. WING,
S. A. COLBY,

Judges.

CLASS 20—STALLION WITH SIX COLTS OF HIS OWN GET.

Best all-work stallion with six of his get, E. H. Lyon, St. Johns.....	\$25 00
Best roadster stallion with six of his get, A. B. Donelson, Pontiac.....	25 00
2d do., S. H. Browne, Kalamazoo.....	20 00
Best draught stallion with six of his get, A. K. & C. H. Tooley, Howell...	25 00

ROBT. MILLIKIN,
H. N. BIDELMAN,
C. SELFRIDGE,

Judges.

DIVISION C—SHEEP.

CLASS 21—THOROUGHbred AMERICAN MERINOS.

Best ram three years old or over, Wm. Ball, Hamburg.....	\$20 00
2d do., L. W. & O. Barnes, Byron.....	15 00
3d do., H. L. Doane, South Lyon.....	10 00
Best ram two years old, A. T. Short, Coldwater.....	20 00
2d do., Will N. Adams, Jackson.....	15 00
3d do., James M. Moore, Brooklyn.....	10 00
Best ram one year old, C. C. Dorr, Grass Lake.....	15 00
2d do., L. W. & O. Barnes, Byron.....	12 00
3d do., C. M. Fellows, Manchester.....	8 00
Best ram lamb, Wm. Ball, Hamburg.....	12 00
2d do., Farrington & Adams, Jackson.....	10 00
3d do., L. W. & O. Barnes, Byron.....	5 00
Best two ewes three years old or over, Wm. Ball, Hamburg.....	20 00
2d do., C. M. Fellows, Manchester.....	15 00
3d do., Will N. Adams, Jackson.....	10 00
Best two ewes two years old, Will N. Adams, Jackson.....	20 00
2d do., Wm. Ball, Hamburg.....	15 00
3d do., C. M. Fellows, Manchester.....	10 00
Best two ewes one year old, E. Kellogg, Osceola.....	15 00
2d do., L. W. & O. Barnes, Byron.....	12 00
3d do., C. M. Fellows, Manchester.....	8 00
Best two ewe lambs, Wm. Ball, Hamburg.....	12 00
2d do., E. Kellogg, Osceola.....	10 00
3d do., Lewis Moulton, Milan.....	5 00

A. S. WHITE,
T. V. QUACKENBUSH,
SOL HATCH,

Judges.

CLASS 22—THOROUGHbred AMERICAN MERINOS BRED AND OWNED IN MICHIGAN.

Best ram two years old or over, L. W. & O. Barnes, Byron.....	\$20 00
2d do., E. Kellogg, Osceola.....	15 00
3d do., L. W. & O. Barnes, Byron.....	10 00
Best ram one year old, E. Kellogg, Osceola.....	15 00
2d do., H. L. Doane, South Lyon.....	12 00
3d do., Will N. Adams, Jackson.....	8 00
Best ram lamb, A. T. Short, Coldwater.....	12 00
2d do., A. T. Short, Coldwater.....	10 00
3d do., A. T. Short, Coldwater.....	5 00

Best two ewes two years old or over, L. W. & O. Barnes, Byron.....	\$20 00
2d do., L. B. Lawrence, Chelsea.....	15 00
3d do., W. I. Gage, South Lyons.....	10 00
Best two ewes one year old, Will N. Adams, Jackson.....	15 00
2d do., D. Euler, Cohocta Center.....	12 00
3d do., L. W. & O. Barnes, Byron.....	8 00
Best two ewe lambs, Wm. Ball, Hamburgh.....	12 00
2d do., D. Euler, Cohocta Center.....	10 00
3d do., A. T. Short, Coldwater.....	5 00

A. S. WHITE,
T. V. QUACKENBUSH,
PHILO S. RICH,

Judges.

CLASS 23—FINE WOOL GRADES.

Best two ewes three years old or over, L. W. & O. Barnes, Byron.....	\$15 00
Best two ewes two years old, L. W. & O. Barnes, Byron.....	12 00
Best two ewes one year old, L. W. & O. Barnes, Byron.....	10 00
2d do., L. W. & O. Barnes, Byron.....	6 00
Best two ewe lambs, L. W. & O. Barnes, Byron.....	8 00
2d do., L. W. & O. Barnes, Byron.....	5 00
3d do., Will N. Adams, Jackson.....	3 00

A. S. WHITE,
PHILO S. RICH,
T. V. QUACKENBUSH,

Judges.

CLASS 24—SOUTHDOWNS.

Best ram two years old or over, John Lessiter, Jersey.....	\$15 00
2d do., A. B. West, Columbiaville.....	10 00
Best ram one year old, Frank Wilson, Jackson.....	12 00
2d do., McGregor & Phillips, St. Clair.....	8 00
3d do., McGregor & Phillips, St. Clair.....	5 00
Best ram lamb, A. B. West, Columbiaville.....	10 00
2d do., John Lessiter, Jersey.....	6 00
3d do., Mrs. Ann Newton, Pontiac.....	4 00
Best two ewes two years old or over, T. B. Bennington, La Porte, Ohio....	15 00
2d do., John Lessiter, Jersey.....	10 00
3d do., A. B. West, Columbiaville.....	6 00
Best two ewes one year old, McGregor & Phillips, St. Clair.....	12 00
2d do., T. B. Bennington, La Porte, Ohio.....	8 00
3d do., John Lessiter, Jersey.....	5 00
Best two ewe lambs, A. B. West, Columbiaville.....	10 00
2d do., T. B. Bennington, La Porte, Ohio.....	6 00
3d do., John Lessiter, Jersey.....	4 00

G. HOWARD,
S. H. TODD,

Judges.

CLASS 25—ALL MIDDLE WOOL SHEEP OTHER THAN SOUTHDOWNS.

Best ram two years old or over, T. B. Bennington, La Porte, Ohio.....	\$15 00
2d do., D. Hubbard, Marshall.....	10 00
3d do., Mrs. Ann Newton, Pontiac.....	6 00
Best ram one year old, Mrs. Ann Newton, Pontiac.....	12 00
2d do., McGregor & Phillips, St. Clair.....	8 00
3d do., J. F. Rundel, Birmingham.....	5 00
Best ram lamb, Mrs. Ann Newton, Pontiac.....	10 00
2d do., Mrs. Ann Newton, Pontiac.....	6 00
3d do., Mrs. Ann Newton, Pontiac.....	4 00
Best two ewes two years old or over, T. B. Bennington, La Porte, Ohio....	15 00
2d do., Mrs. Ann Newton, Pontiac.....	10 00
3d do., G. Longmuir, Pontiac.....	6 00

Best two ewes one year old, Mrs. Ann Newton, Pontiac.....	\$12 00
2d do., J. F. Rundel, Birmingham.....	8 00
3d do., McGregor & Phillips, St. Clair.....	5 00
Best two ewe lambs, Mrs. Ann Newton, Pontiac.....	10 00
2d do., T. B. Bennington, La Porte, Ohio.....	6 00
3d do., J. F. Rundel, Birmingham.....	4 00

G. HOWARD,
S. H. TODD,
Judges.

CLASS 26—LEICESTERS.

Best ram two years old or over, Mrs Ann Newton, Pontiac.....	\$15 00
2d do., A. F. Wood, Mason.....	10 00
3d do., A. F. Wood, Mason.....	6 00
Best ram one year old, Mrs. Ann Newton, Pontiac.....	12 00
2d do., A. F. Wood, Mason.....	8 00
3d do., A. F. Wood, Mason.....	5 00
Best ram lamb, Mrs. Ann Newton, Pontiac.....	10 00
2d do., A. F. Wood, Mason.....	6 00
3d do., A. F. Wood, Mason.....	4 00
Best two ewes two years old or over, Mrs. Ann Newton, Pontiac.....	15 00
2d do., A. F. Wood, Mason.....	10 00
3d do., A. F. Wood, Mason.....	6 00
Best two ewes one year old, A. F. Wood, Mason.....	12 00
2d do., Mrs. Ann Newton, Pontiac.....	8 00
Best two ewe lambs, Mrs. Ann Newton, Pontiac.....	10 00
2d do., A. F. Wood, Mason.....	6 00
3d do., A. F. Wood, Mason.....	4 00

G. HOWARD,
S. H. TODD,
Judges.

CLASS 27—COTSWOLD AND OTHER LONG WOOLED SHEEP.

Best ram two years old or over, Frank Wilson, Jackson.....	\$15 00
2d do., Mrs. Ann Newton, Pontiac.....	10 00
3d do., Montgomery & Westfall, Hillsdale.....	6 00
Best ram one year old, Frank Wilson.....	12 00
2d do., Montgomery & Westfall, Hillsdale.....	8 00
3d do., Frank Wilson, Jackson.....	5 00
Best ram lamb, Frank Wilson, Jackson.....	10 00
2d do., Frank Wilson, Jackson.....	6 00
3d do., Montgomery & Westfall, Hillsdale.....	4 00
Best two ewes two years old or over, Montgomery & Westfall, Hillsdale..	15 00
2d do., Frank Wilson, Jackson.....	10 00
3d do., Montgomery & Westfall, Hillsdale.....	6 00
Best two ewes one year old, Frank Wilson, Jackson.....	12 00
2d do., Frank Wilson, Jackson.....	8 00
3d do., Montgomery & Westfall, Hillsdale.....	5 00
Best two ewe lambs, Frank Wilson, Jackson.....	10 00
2d do., Frank Wilson, Jackson.....	6 00
3d do., Montgomery & Westfall, Hillsdale.....	4 00

G. HOWARD,
S. H. TODD,
Judges.

CLASS 23—GRADE COARSE WOOLED EWES.

Best two ewes two years old or over, Frank Wilson, Jackson.....	\$12 00
Best two ewes one year old, Frank Wilson, Jackson.....	10 00
Best two ewe lambs, Frank Wilson, Jackson.....	8 00
2d do., Mrs. Ann Newton, Pontiac.....	5 00

G. HOWARD,
S. H. TODD,
Judges.

CLASS 29—FAT SHEEP.

Best two middle wooled sheep two years, under three years old, Mrs. Ann Newton, Pontiac.....	\$10 00
2d do., G. Longmuir, Pontiac.....	8 00
3d do., T. B. Bennington, La Porte, Ohio.....	5 00
Best two middle wooled sheep one year, under two years old, Mrs. Ann Newton, Pontiac.....	10 00
2d do., John Lessiter, Jersey.....	8 00
3d do., T. B. Bennington, La Porte, Ohio.....	5 00
Best two long wooled sheep two years, under three years old, Mrs. Ann Newton, Pontiac.....	10 00
2d do., Frank Wilson, Jackson.....	8 00
Best two long wooled sheep one year, under two years old, Mrs. Ann Newton, Pontiac.....	10 00
2d do., A. F. Wood, Mason.....	8 00
3d do., Frank Wilson, Jackson.....	5 00
Best two grade sheep two years, under three years old, Frank Wilson, Jackson.....	10 00
2 do., Mrs. Ann Newton, Pontiac.....	8 00

G. HOWARD,

S. H. TODD,

Judges.

DIVISION D—SWINE.

CLASS 30—BERKSHIRES.

Best boar two years old or over, R. P. Gustin, Bay City.....	\$12 00
2d do., John Hardenbergh, Farmington.....	8 00
Best boar one year old, R. P. Gustin, Bay City.....	10 00
2d do., J. C. Chilson, Livonia.....	6 00
3d do., R. V. Gustin, Bay City.....	3 00
Best boar under one year old, M. Hebblethwaite, Berlinville, Ohio.....	8 00
2d do., R. P. Gustin, Bay City.....	5 00
3d do., R. P. Gustin, Bay City.....	3 00
Best brood sow two years old or over, R. P. Gustin, Bay City.....	12 00
2d do., J. C. Chilson, Livonia.....	8 00
3d do., John Hardenbergh, Farmington.....	4 00
Best sow one year old, R. P. Gustin, Bay City.....	10 00
2d do., M. Hebblethwaite, Berlinville, Ohio.....	6 00
Best sow under one year old, R. P. Gustin, Bay City.....	8 00
2d do., M. Hebblethwaite, Berlinville, Ohio.....	5 00
3d do., M. Hebblethwaite, Berlinville, Ohio.....	3 00
Best pen of pigs not over six months old, M. Hebblethwaite, Berlinville, Ohio.....	8 00
2d do., R. P. Gustin, Bay City.....	5 00
3d do., J. C. Chilson, Livonia.....	3 00
Best boar of any age, R. P. Gustin, Bay City.....	Diploma

J. F. FERGUSON,

E. MCGUNEGH,

Judges.

ESSEX.

Best boar, two years old or over, Patrick Milet, Howell.....	\$12 00
2d do., Frank Wilson, Jackson.....	8 00
3d do., E. T. Doney, Jackson.....	4 00
Best boar, one year old, E. T. Doney, Jackson.....	10 00
2d do., Patrick Milet, Howell.....	6 00
Best boar, under one year old, Frank Wilson, Jackson.....	8 00
2d do., E. T. Doney, Jackson.....	5 00
3d do., Patrick Milet, Howell.....	3 00
Best brood sow, two years old or over, Frank Wilson, Jackson.....	12 00
2d do., E. T. Doney, Jackson.....	8 00
3d do., Patrick Milet, Howell.....	4 00

Best sow, one year old, E. T. Doney, Jackson.....	\$10 00
2d do., Patrick Milet, Howell.....	6 00
3d do., Frank Wilson, Jackson.....	3 00
Best sow, under one year old, E. T. Doney, Jackson.....	8 00
2d do., Frank Wilson, Jackson.....	3 00
3d do., Patrick Milet, Howell.....	3 00
Best pen of pigs, not over six months old, Frank Wilson, Jackson.....	8 00
2d do., E. T. Doney, Jackson.....	5 00
3d do., Patrick Milet, Howell.....	3 00
Best boar, of any age, Patrick Milet, Howell.....	Diploma

J. F. FERGUSON,

E. McGUNEGH,

Judges.

SUFFOLKS AND SMALL YORKSHIRES.

Best boar, two years old or over, Frank Wilson, Jackson.....	\$12 00
Best boar, one year old, Alfred Ganson, Fentonville.....	10 00
2d do., Alfred Ganson, Fentonville.....	6 00
Best boar, under one year old, Frank Wilson, Jackson.....	8 00
2d do., Alfred Ganson, Fentonville.....	5 00
3d do., Alfred Ganson, Fentonville.....	3 00
Best brood sow, two years old or over, Alfred Ganson, Fentonville.....	12 00
2d do., Frank Wilson, Jackson.....	8 00
3d do., Alfred Ganson, Fentonville.....	4 00
Best sow, one year old, Frank Wilson, Jackson.....	10 00
2d do., Alfred Ganson, Fentonville.....	6 00
Best sow, under one year old, Frank Wilson, Jackson.....	8 00
2d do., Frank Wilson, Jackson.....	5 00
3d do., Alfred Ganson, Fentonville.....	3 00
Best pen of pigs, not over six months old, Alfred Ganson, Fentonville.....	8 00
Best boar of any age, Frank Wilson, Jackson.....	Diploma

J. F. FERGUSON,

E. McGUNEGH,

Judges.

POLAND-CHINAS.

Best boar, one year old, L. W. & O. Barns, Byron.....	\$10 00
2d do., Bradford & Garrish, Rochester Depot, Ohio.....	6 00
3d do., L. W. & O. Barns, Byron.....	3 00
Best boar, under one year old, L. W. & O. Barns, Byron.....	8 00
2d do., S. H. Todd, Wakeman, Ohio.....	5 00
3d do., Bradford & Garrish, Rochester Depot, Ohio.....	3 00
Best sow, two years old or over, S. H. Todd, Wakeman, Ohio.....	12 00
2d do., L. W. & O. Barns, Byron.....	8 00
3d do., Bradford & Garrish, Rochester Depot, Ohio.....	4 00
Best sow, one year old, Bradford & Garrish, Rochester Depot, Ohio.....	10 00
2d do., S. H. Todd, Wakeman, Ohio.....	6 00
3d do., L. W. & O. Barns, Byron.....	3 00
Best sow, under one year old, S. H. Todd, Wakeman, Ohio.....	8 00
2d do., S. H. Todd, Wakeman, Ohio.....	5 00
3d do., L. W. & O. Barns, Byron.....	3 00
Best pen of pigs, not over six months old, Bradford & Garrish, Rochester Depot, Ohio.....	8 00
2d do., S. H. Todd, Wakeman, Ohio.....	5 00
3d do., L. W. & O. Barns, Byron.....	3 00
Best boar, of any age, L. W. & O. Barns, Byron.....	Diploma

J. F. FERGUSON,

E. McGUNEGH,

Judges.

CHESTER WHITES AND LARGE YORKSHIRES.

Best boar, two years old or over, S. H. Todd, Wakeman, Ohio.....	\$12 00
Best boar, one year old, S. H. Todd, Wakeman, Ohio.....	10 00
Best boar, under one year old, S. H. Todd, Wakeman, Ohio.....	8 00
2d do., S. H. Todd, Wakeman, Ohio.....	5 00

Best sow, two years old or over, S. H. Todd, Wakeman, Ohio.....	\$12 00
2d do., S. H. Todd, Wakeman, Ohio.....	8 00
Best sow, one year old, S. H. Todd, Wakeman, Ohio.....	10 00
2d do., S. H. Todd, Wakeman, Ohio.....	6 00
Best sow, under one year old, S. H. Todd, Wakeman, Ohio.....	8 00
2d do., S. H. Todd, Wakeman, Ohio.....	5 00
3d do., S. H. Todd, Wakeman, Ohio.....	3 00
Best pen of pigs, not over six months old, S. H. Todd, Wakeman, Ohio....	8 00
2d do., S. H. Todd, Wakeman, Ohio.....	5 00

J. F. FERGUSON,
E. McGUNEGH,

Judges.

FAT HOGS.

Best barrow or sow, over one year old, Bradford & Garris, Rochester Depot, Ohio.....	\$10 00
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J. F. FERGUSON,
E. McGUNEGH,

Judges.

DIVISION E—POULTRY.

CLASS 31.

Best, most varied, and most valuable collection of poultry, S. E. Wurst, Elyria, Ohio.....	\$15 00
2d do., E. & F. Sites, West Dover, Ohio.....	10 00

ASIATIC CLASS.

Best pair of Light Brahma fowls, James Ball, Marshall.....	2 00
2d do., Geo. A. Terpenning, Reading.....	1 00
Best pair of Light Brahma chicks, E. & F. Sites, West Dover, Ohio.....	2 00
2d do., James Ball, Marshall.....	1 00
Best pair of Dark Brahma fowls, W. H. Reed, Charlotte.....	2 00
2d do., James Ball, Marshall.....	1 00
Best pair of Dark Brahma chicks, James Ball, Marshall.....	2 00
2d do., W. H. Rand, Charlotte.....	1 00
Best pair of Buff Cochin fowls, S. E. Wurst, Elyria, Ohio.....	2 00
2d do., W. H. Rand, Charlotte.....	1 00
Best pair of Partridge or Grouse Cochin fowls, James Reed, Detroit.....	2 00
2d do., James Ball, Marshall.....	1 00
Best pair of Partridge or Grouse Cochin chicks, James Ball, Marshall.....	2 00
2d do., James Reed, Detroit.....	1 00
Best pair of white Cochin fowls, Ambrose Purchase, Auburn.....	2 00
2d do., Geo. A. Terpenning, Reading.....	1 00
Best pair of white Cochin chicks, S. E. Wurst, Elyria, Ohio.....	2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00
Best pair of Black Cochin fowls, James Ball, Marshall.....	2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00
Best pair of Black Cochin chicks, James Ball, Marshall.....	2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00
Best pair of Langshan fowls, W. O. Dakin, Toledo, Ohio.....	2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00
Best pair of Langshan chicks, S. E. Wurst, Elyria, Ohio.....	2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00

DORKING CLASS.

Best pair of Colored Dorking fowls, E. & F. Sites, West Dover, Ohio.....	2 00
2d do., Geo. A. Terpenning, Reading.....	1 00
Best pair of Colored Dorking chicks, E. & F. Sites, West Dover, Ohio.....	2 00
Best pair of white Dorking fowls, E. & F. Sites, West Dover.....	2 00
Best pair of white Dorking chicks, E. & F. Sites, West Dover, Ohio.....	2 00
Best pair of Dominique fowls, Geo. A. Terpenning, Reading.....	2 00
2d do., E. & F. Sites, West Dover, Ohio.....	1 00
Best pair of Dominique chicks, E. & F. Sites, West Dover, Ohio.....	2 00

AMERICAN CLASS.

Best pair of Plymouth Rock fowls, M. Esler, Grand Ledge.....	\$2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00
Best pair of Plymouth Rock chicks, S. E. Wurst, Elyria, Ohio.....	2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00

GAME CLASS.

Best pair of black breasted red game fowls, E. & F. Sites, West Dover, Ohio.....	2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00
Best pair of black breasted red game chicks, E. & F. Sites, West Dover, O..	2 00
2d do., W. H. Rand, Charlotte.....	1 00
Best pair of duckwing game fowls, E. & F. Sites, West Dover, Ohio.....	2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00
Best pair of duckwing game chicks, E. & F. Sites, West Dover, Ohio.....	2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00
Best pair of pile game fowls, E. & F. Sites, West Dover.....	2 00
2d do., W. H. Rand, Charlotte.....	1 00
Best pair of pile game chicks, E. & F. Sites, West Dover, Ohio.....	2 00
2d do., W. H. Rand, Charlotte.....	1 00

SPANISH CLASS.

Best pair of black Spanish fowls, Geo. A. Terpenning, Reading.....	2 00
2d do., Geo. A. Terpenning, Reading.....	1 00
Best pair of black Spanish chicks, Geo. A. Terpenning, Reading.....	2 00
2d do., Geo. A. Terpenning, Reading.....	1 00
Best pair of white leghorn fowls, Ambrose Purchase, Auburn.....	2 00
2d do., W. H. Rand, Charlotte.....	1 00
Best pair of white leghorn chicks, S. E. Wurst, Elyria, Ohio.....	2 00
2d do., M. Esler, Grand Ledge.....	1 00
Best pair of brown leghorn fowls, Ambrose Purchase, Auburn.....	2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00
Best pair brown leghorn chicks, S. E. Wurst, Elyria, Ohio.....	2 00
2d do., E. Hamilton, Royal Oak.....	1 00

POLISH CLASS.

Best pair of black polish chicks, E. & F. Sites, West Dover, Ohio.....	2 00
2d do., James Ball, Marshall.....	1 00
Best pair of white polish fowls, E. & F. Sites, West Dover, Ohio.....	2 00
2d do., Ambrose Purchase, Auburn.....	1 00
Best pair of silver polish fowls, E. & F. Sites, West Dover, Ohio.....	2 00
2d do., Ambrose, Auburn.....	1 00
Best pair of Silver Polish chicks, E. & F. Sites, West Dover, Ohio.....	2 00
2d do., James Ball, Marshall.....	1 00
Best pair of Golden Polish fowls, W. H. Rand, Charlotte.....	2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00
Best pair of Golden Polish chicks, James Ball, Marshall.....	2 00
2d do., James Ball, Marshall.....	1 00

FRENCH CLASS.

Best pair of Crevecœur fowls, E. & F. Sites, West Dover, Ohio.....	2 00
Best pair of Crevecœur chicks, E. & F. Sites, West Dover, Ohio.....	2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00
Best pair of Houdan fowls, Geo. A. Terpenning, Reading.....	2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00
Best pair Houdan chicks, S. E. Wurst, Elyria, Ohio.....	2 00
2d do., Ambrose Purchase, Auburn.....	1 00

HAMBURG CLASS.

Best pair of golden spangled Hamburg fowls, E. & F. Sites, West Dover, Ohio.....	2 00
Best pair of silver spangled Hamburg fowls, S. E. Wurst, Elyria, Ohio.....	2 00
2d do., E. Hamilton, Royal Oak.....	1 00
Best pair of silver spangled Hamburg chicks, W. H. Rand, Charlotte.....	2 00
Best pair of golden penciled Hamburg fowls, Ambrose Purchase, Auburn.....	2 00
Best pair of golden penciled Hamburg chicks, S. E. Wurst, Elyria, Ohio.....	2 00

Best pair of black Hamburg fowls, Ambrose Purchase, Auburn.....	\$2 00
2d do., W. H. Rand, Charlotte.....	1 00
Best pair of black Hamburg chicks, W. H. Rand Charlotte.....	2 00

MISCELLANEOUS CLASS.

Best pair of silkie fowls, James Ball, Marshall.....	2 00
Best pair of silkie chicks, S. E. Wurst, Elyria, Ohio.....	2 00

BANTAM CLASS.

Best pair of black breasted red game bantam fowls, S. E. Wurst, Elyria, Ohio.....	2 00
2d do., Geo. A. Terpenning, Reading.....	1 00
Best pair of black breasted red game bantam chicks, S. E. Wurst, Elyria, Ohio.....	2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00
Best pair of duckwing game bantam fowls, Ambrose Purchase, Auburn.....	2 00
2d do., E. & F. Sites, West Dover, Ohio.....	1 00
Best pair of duckwing game bantam chicks, Ambrose Purchase, Auburn.....	2 00
2d do., E. & F. Sites, West Dover, Ohio.....	1 00
Best pair of silver laced seabright bantam fowls, W. H. Rand, Charlotte.....	2 00
Best pair of white bantam fowls, E. & F. Sites, West Dover, Ohio.....	2 00
Best pair of white bantam chicks, E. Hamilton, Royal Oak.....	2 00
2d do., Ambrose Purchase, Auburn.....	1 00
Best pair of golden laced seabright bantam fowls, S. E. Wurst, Elyria, Ohio.....	2 00
2d do., W. H. Rand, Charlotte.....	1 00
Best pair of golden laced seabright bantam chicks, Geo. A. Terpenning, Reading.....	2 00
2d do., Geo. A. Terpenning, Reading.....	1 00
Best pair of black African bantam fowls, Geo. A. Terpenning, Reading.....	2 00
2d do., Geo. A. Terpenning, Reading.....	1 00
Best pair of black African bantam chicks, Geo. A. Terpenning, Reading.....	2 00

TURKEY CLASS.

Best pair of bronze turkeys, W. H. Rand, Charlotte.....	2 00
2d do., E. & G. Sites, West Dover, Ohio.....	1 00
Best pair of white turkeys, Ambrose Purchase, Auburn.....	2 00
Best pair of slate turkeys, Ambrose Purchase, Auburn.....	2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00
Best pair of black turkeys, Ambrose Purchase, Auburn.....	2 00

ORNAMENTAL CLASS.

Best pair of peafowls, W. H. Rand, Charlotte.....	2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00
Best pair of pearl guinea fowls, Geo. A. Terpenning, Reading.....	2 00
2d do., Ambrose Purchase, Auburn.....	1 00
Best pair of white guinea fowls, S. E. Wurst, Elyria, Ohio.....	2 00

GOOSE CLASS.

Best pair of Toulouse geese, S. E. Wurst, Elyria, Ohio.....	2 00
2d do., Ambrose Purchase, Auburn.....	1 00
Best pair of Bremen geese, E. & F. Sites, West Dover, Ohio.....	2 00
2d do., Ambrose Purchase, Auburn.....	1 00
Best pair of brown Chinese geese, S. E. Wurst, Elyria, Ohio.....	2 00
Best pair of dark Chinese geese, E. & F. Sites, West Dover, Ohio.....	2 00
Best pair of white Chinese geese, S. E. Wurst, Elyria, Ohio.....	2 00
2d do., Ambrose Purchase, Auburn, Mich.....	1 00

DUCK CLASS.

Best pair of Rouen Ducks, S. E. Wurst, Elyria, Ohio.....	2 00
2d do., Geo. A. Terpenning, Reading.....	1 00
Best pair of Aylesbury ducks, S. E. Wurst, Elyria, Ohio.....	2 00
Best pair of Cayuga ducks, Ambrose Purchase, Auburn.....	2 00
3d do., S. E. Wurst, Elyria, Ohio.....	1 00
Best pair of topknot ducks, S. E. Wurst, Elyria, Ohio.....	2 00

Best pair of Musk or Muscovy ducks, S. E. Wurst Elyria, Ohio.....	\$2 00
Best pair Pekin ducks, James Ball, Marshall.....	2 00
2d do., E. & F. Site, West Dover, Ohio.....	1 00

RABBIT CLASS.

Best lop-eared buck rabbit, S. E. Wurst, Elyria, Ohio.....	2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00
Best lop-eared doe rabbit, S. E. Wurst, Elyria, Ohio.....	2 00
2d do., S. E. Wurst, Elyria, Ohio.....	1 00
Best pair of common rabbits, S. E. Wurst, Elyria, Ohio.....	2 00
2d do., Ambrose Purchase, Auburn.....	1 00

PIGEON CLASS.

Best, most varied, and valuable collection of pigeons, Christ Wagner, Detroit.....	5 00
2d do., A. Otto, Detroit.....	3 00

MINOR PET CLASS.

Best pair of Guinea pigs, S. E. Wurst, Elyria, Ohio.....	2 00
2d do., Ambrose Purchase, Auburn.....	1 00
Best pair of squirrels, Ambrose Purchase, Auburn.....	2 00
Best pair of ferrets, S. E. Wurst Elyria, Ohio.....	2 00
2d do., James Ball, Marshall.....	1 00

STUFFED BIRDS.

Best collection of stuffed birds, S. Mummery, Detroit.....	10 00
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NON ENUMERATED.

Pair of pile game bantam fowls, E. & F. Sites, West Dover, Ohio.....	1 00
Pair of pile game bantam fowls, E. & F. Sites, West Dover, Ohio.....	2 00
Pair of silver penciled Hamburg fowls, E. & F. Sites, West Dover, Ohio.....	2 00
Pair of pile game bantam chicks, E. & F. Sites, West Dover, Ohio.....	2 00
Pair of capon fowls, S. E. Wurst, Elyria, Ohio.....	2 00
Pair of capon fowls, S. E. Wurst, Elyria, Ohio.....	1 00

S. W. CURTISS,
Judge.

DIVISION F—FARM AND GARDEN PRODUCE AND MANUFACTURED PRODUCTS.

CLASS 32—GRAIN AND SEEDS.

Best bushel of winter red wheat, R. M. Cross, Ovid.....	\$6 00
2d do., Thos. A. More, Ypsilanti.....	4 00
Best bushel of winter white wheat, L. M. Cross, Ovid.....	6 00
2d do., W. A. Hayes, Rochester.....	4 00
Best bushel of rye, D. Woodman, Paw Paw.....	5 00
Best bushel of four-rowed barley, D. Woodman, Paw Paw.....	5 00
2d do., C. H. Gibbs, Pontiac.....	3 00
Best bushel of oats, C. V. West, Blanchard.....	5 00
2d do., A. J. Burrows, Troy.....	3 00
Best bushel of dent corn in ear, Thos. A. Moore, Ypsilanti.....	5 00
Best bushel of flint corn in ear, Henry Ford, Greenfield.....	5 00
2d do., Henry Ford Greenfield.....	3 00
Best bushel of white beans, R. M. Cross, Ovid.....	5 00
Best bushel of large clover seed, R. M. Cross, Ovid.....	5 00
Best bushel of timothy seed, R. M. Cross, Ovid.....	5 00
Best bushel of buckwheat, R. M. Cross, Ovid.....	3 00
Best general assortment of seeds for field crops, W. S. Penfield, Detroit.....	10 00
2d do., D. Woodman, Paw Paw.....	5 00
Best assortment and greatest variety of kitchen garden seeds, M. E. Bartlett, Tomkins.....	10 00
Best display and collection of the several kinds of grain in heads, D. Woodman, Paw Paw.....	10 00
Best display of the several kinds of grain in head with stool and roots entire, accompanied by the berry, and with sample of flour of such grains as are milled, D. Woodman, Paw Paw.....	10 00

Best display of corn in ear, D. Woodman, Paw Paw.....	\$10 00
Best display of the several kinds of grasses in stalk and head, M. E. Bartlett, Tomkins.....	5 00

NON ENUMERATED.

Bushel of winter Barley, D. Woodman, Paw Paw.....	5 00
A. B. GULLEY, E. CRANE, <i>Judges.</i>	

CLASS 33—ROOTS AND VEGETABLES.

Best three varieties of early potatoes, Thomas Langley, Greenfield.....	\$3 00
Best sample peck of early potatoes, Thomas Langley, Greenfield.....	3 00
2d do., Jacob Neuschafer, White Wood.....	2 00
Best sample peck of late potatoes, E. T. Doney, Jackson.....	3 00
2d do., Henry Ford, Greenfield.....	2 00
Best three nutmeg melons, Albert Zuike, Detroit.....	2 00
A. B. GULLEY, E. CRANE, <i>Judges.</i>	

CLASS 33½—DISPLAY OF ROOTS AND VEGETABLES.

Best display of roots and vegetables by a professional gardener, H. Marx, Detroit.....	\$50 00
A. B. GULLEY, E. CRANE, <i>Judges.</i>	

CLASS 34—FLOUR, MEAL, AND FEED.

Best sample of bolted meal, M. E. Bartlett, Tomkins.....	\$2 00
Best sample of corn meal, M. E. Bartlett, Tomkins.....	2 00
Best sample of ground feed, M. E. Bartlett, Tomkins.....	2 00
Best sample of buckwheat flour, M. E. Bartlett, Tomkins.....	2 00
Best sample of rye flour, M. E. Bartlett, Tomkins.....	2 00
Best sample of graham flour, M. E. Bartlett, Tomkins.....	2 00
Best sample of oatmeal, M. E. Bartlett, Tomkins.....	2 00
A. B. GULLEY, E. CRANE, <i>Judges.</i>	

DIVISION G—DAIRY AND OTHER PRODUCTS.

CLASS 35—BUTTER, CHEESE, AND DAIRY ARTICLES.

Best twenty-five pounds of domestic butter, made in June, Mrs. G. C. Gibbs, Big Beaver, Mich.....	\$15 00
2d do., Mrs. Chas. Adams, Rochester.....	12 00
3d do., John Lessiter, Jersey.....	8 00
Best twenty-five pounds of domestic butter, made at any other time, John Lessiter, Jersey.....	15 00
2d do., Hugh Fenton, Lexington.....	12 00
3d do., C. H. Gibbs, Pontiac.....	8 00
Best fifty pounds of creamery butter, J. C. Cunningham, Reading.....	15 00
2d do., Knapp & Benson, Adrian.....	12 00
3d do., Michigan Creamery Co., Detroit.....	8 00
Best display of cheese, Wm. Allen, Livonia.....	25 00
2d do., A. D. Power, Northville.....	20 00
3d do., Walter Bordwell, Olivet.....	15 00
Best assortment of wooden ware for dairy or kitchen use, Cornish & Curtis, Fort Atkinson, Wis.....	3 00
Best cheese press, O. P. Morgan, Hazleton.....	1 00
Best cheese safe, E. T. Barnum Wire & Iron Works, Detroit.....	1 00
Best milk strainer, John Boyd, Chicago, Ill.....	1 00

Best milk safe, E. T. Barnum Wire and Iron Works, Detroit.....	\$3 00
Best scales for dairy use, Buffalo Scale Co., Buffalo, N. Y.....	1 00

NON-ENUMERATED.

Sample butter ladles, Cornish & Curtis, Fort Atkinson, Wis.....	1 00
Sample butter spades, Cornish & Curtis, Fort Atkinson, Wis.....	1 00
Sample butter packers, Cornish & Curtis, Fort Atkinson, Wis.....	1 00
Sample butter thermometers, Cornish & Curtis, Fort Atkinson, Wis.....	1 00
Wilson's cabinet creamery, Flint Cabinet Creamery Co., Flint.....	1 00
Milk can, Haney & Campbell, Bellevue, Iowa.....	1 00
Butter printer, A. H. Reid, Philadelphia, Pa.....	2 00
Shipping box for butter, A. H. Reid, Philadelphia, Pa.....	1 00

HENRY CHAMBERLAIN,

T. J. HAYWOOD,

D. W. CURTIS,

Judges on Butter and Cheese.

HENRY CHAMBERLAIN,

D. P. REID,

Judges on Dairy Articles.

CLASS 36—SUGAR, BREAD, AND PICKLES.

Best machine-made bread, M. E. Bartlett, Tompkins.....	\$3 00
Best three loaves of bakers' bread, A. Smith, Detroit.....	3 00
Best three loaves of milk or salt rising bread, M. E. Bartlett, Tompkins...	3 00
2d do., A. C. Gardner, Detroit.....	2 00
Best soda rising bread, M. E. Bartlett, Tompkins.....	3 00
2d do., Miss Clara A. Peacock, Pontiac.....	1 00
Best three loaves of yeast bread, Miss Belle Snow, Detroit.....	3 00
2d do., A. Smith, Detroit.....	1 00
Best corn bread, M. E. Bartlett, Tompkins.....	3 00
2d do., Miss Mary Leslie, Dearborn.....	2 00
Best three loaves of brown bread, W. J. Woodhouse, Springwells.....	3 00
2d do., A. Smith, Detroit.....	2 00
Best sample of flour bread made by girl 16 years or under, M. E. Bartlett, Tompkins.....	3 00
Best sample of brown bread made by girl 16 years or under, M. E. Bartlett, Tompkins.....	3 00
Best display of specimens of pickled vegetables, Nellie S. Nabors, Flint...	5 00

NON-ENUMERATED.

Three loaves of hop bread, A. C. Gardner, Detroit.....	2 00
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L. S. WHITE,

AMY BARCIKE,

Judges.

DIVISION H—CLASS 38—BEES, HONEY, AND APIARIAN IMPLEMENTS.

Best colony of bees of any kind, M. H. Hunt, Bell Branch.....	\$8 00
2d do., W. Z. Hutchinson, Rogersville.....	4 00
Best colony of Italian bees, W. Z. Hutchinson, Rogersville.....	8 00
2d do., H. M. Hunt, Bell Branch.....	4 00
Best colony of Syrian bees, W. Z. Hutchinson, Rogersville.....	8 00
Best collection of queen bees alive, W. Z. Hutchinson, Rogersville.....	5 00
Best display of queen bees under glass, M. H. Hunt, Bell Branch.....	5 00
2d do., W. Z. Hutchinson, Rogersville.....	3 00
Best display of comb honey, W. Z. Hutchinson, Rogersville.....	15 00
2d do., M. H. Hunt, Bell Branch.....	10 00
Best display of extracted honey, M. H. Hunt, Bell Branch.....	10 00
2d do., W. Z. Hutchinson, Rogersville.....	5 00
Best specimen of comb honey, ten pounds or more, W. Z. Hutchinson, Rogersville.....	8 00
2d do., M. H. Hunt, Bell Branch.....	4 00

Best specimen of extracted honey not less than ten pounds, M. H. Hunt, Bell Branch.....	\$5 00
2d do., W. Z. Hutchinson, Rogersville.....	3 00
Best ten pounds of beeswax, W. Z. Hutchinson, Rogersville.....	4 00
2d do., James Fry, Leslie.....	2 00
Best specimen of comb foundation, M. H. Hunt, Bell Branch.....	3 00
2d do., W. Z. Hutchinson, Rogersville.....	1 00
Best collection aparian implements, H. D. Cutting, Clinton.....	10 00
2d do., M. H. Hunt, Bell Branch.....	5 00
Best honey extractor, E. T. Lewis, Toledo, Ohio.....	5 00
2d do., H. D. Cutting, Clinton.....	3 00
Best bee smoker, M. H. Hunt, Bell Branch.....	3 00
2d do., H. D. Cutting, Clinton.....	2 00
Honey knife for uncapping, H. D. Cutting, Clinton.....	50
Honey knife, for uncapping, W. Z. Hutchinson, Rogersville.....	50
Best comb foundation machine, H. D. Cutting, Clinton.....	5 00
2d do., M. H. Hunt, Bell Branch.....	3 00
Best wax extractor, E. T. Lewis, Toledo, Ohio.....	3 00
2d do., M. H. Hunt, Bell Branch.....	2 00
Best movable frame bee hive for all purposes, W. O. Burk, Crystal.....	8 00
2d do., H. D. Cutting, Clinton.....	5 00
Queen cage for shipping and introducing queens, H. D. Cutting, Clinton.....	66
do., W. Z. Hutchinson, Rogersville.....	66
do., M. H. Hunt, Bell Branch.....	66
Honey box for comb honey, W. Z. Hutchinson, Rogersville.....	50
do., H. D. Cutting, Clinton.....	50
Best collection of honey bearing plants, pressed and mounted or in bloom, Clarence M. Weed, Lansing.....	5 00
2d do., W. Z. Hutchinson, Rogersville.....	3 00
Best collection of bee literature, H. D. Cutting, Clinton.....	8 00
2d do., W. Z. Hutchinson, Rogersville.....	1 00

NON-ENUMERATED.

Fountain's pump for controlling swarms, W. Z. Hutchinson, Rogersville...	2 00
Folding tent for handling bees when robber bees are troublesome, W. Z. Hutchinson, Rogersville.....	2 00
Queen excluding honey board, W. Z. Hutchinson, Rogersville.....	2 00
Bee feeder, W. Z. Hutchinson, Rogersville.....	1 00
Can for holding section boxes while on hive, W. Z. Hutchinson, Rogersville.....	1 00
Bee veil, E. T. Lewis, Toledo, Ohio.....	1 00

DIVISION J—VEHICLES.

CLASS 45.

Best display of heavy work in this class, Flint Wagon Co., Flint.....	Diploma.
Best display of light work in this class, Clark & Co., Lansing.....	Diploma.

DIVISION L—MANUFACTURED GOODS AND MATERIALS.

CLASS 48—MATERIALS.

Best display of fine wools, C. M. Fellows, Manchester.....	\$7 00
2d do., R. M. Cross, Ovid.....	5 00
3d do., A. S. White, Hart.....	3 00
Best display of long wools, Amos F. Wood, Mason.....	7 00
2d do., John Taylor, Marcellus.....	5 00
3d do., M. E. Bartlett, Tompkins.....	3 00
Best display of middle wools, Thos. A. Moore, Ypsilanti.....	7 00
2d do., B. D. Kelley, Ypsilanti.....	5 00
3d do., B. D. Kelley, Ypsilanti.....	3 00
Best display of prepared flax, Sarah Barber, Fairfield.....	5 00
2d do., Sarah Barber, Fairfield.....	3 00
Best display of willow for chair work, A. Dondero, Detroit.....	5 00

R. B. CARUSS,
J. W. HIBBARD,

Judges.

CLASS 51—ARTICLES OF LEATHER AND INDIA RUBBER.

Best display of trunks not less than ten, Martin Muir, Detroit.....	\$10 00
2d do., J. M. Brunson, Detroit.....	5 00
Best traveling trunk, Martin Muir, Detroit.....	3 00
Best hand trunk, Martin Muir, Detroit.....	1 00
Best lady's hand trunk, Martin Muir, Detroit.....	1 00
Best pair of kip boots, S. P. Wilcox & Co., Detroit.....	1 00
Best pair of lady's winter walking boots, J. B. Stevens, Detroit.....	1 00
Best pair of Misses' shoes, S. P. Wilcox & Co., Detroit.....	1 00
Best pair of children's shoes, S. P. Wilcox & Co., Detroit.....	1 00
Best pair of gent's slippers, S. P. Wilcox & Co., Detroit.....	1 00
Best pair of lady's slippers, S. P. Wilcox & Co., Detroit.....	1 00
Best double carriage harness, made in the State, Geo. E. McCulley, Detroit.....	3 00
Best single buggy harness, made in the State, Geo. E. McCulley, Detroit.....	3 00
2d do., James Stewart, Detroit.....	2 00
Best double harness for farm, made in the State, James Stewart, Detroit.....	3 00
Best cart harness, made in the State, James Stewart, Detroit.....	2 00
Best gent's riding saddle, made in the State, James Stewart, Detroit.....	3 00
2d do., Geo. E. McCulley, Detroit.....	2 00
Best lady's riding saddle, made in the State, James Stewart, Detroit.....	3 00
2d do., Geo. E. McCulley, Detroit.....	2 00
Best riding bridle, made in the State, James Stewart, Detroit.....	2 00
2d do., Geo. E. McCulley, Detroit.....	1 00
Best horse collar, made in the State, James Stewart, Detroit.....	2 00
Best leather belting, made in the State, Croul Bros., Detroit.....	10 00
Best display of boots and shoes manufactured in the State, J. B. Stevens, Detroit.....	10 00

NON-ENUMERATED.

Display of whips and whip lashes, W. Skellington, Detroit.....	5 00
Patent saddle, E. D. Bliss, Jackson.....	2 00
Wire button-hole stag for shoes, etc., E. Hamburger, Detroit.....	1 00

ROBERT L. HEWITT

J. W. HIBBARD,

THOMAS A. MOORE,

Judges.

CLASS 52—FURNITURE.

Best set of parlor furniture, Keck, Winterhalter & Co., Detroit.....	\$20 00
Best easy chair, Keck, Winterhalter & Co., Detroit.....	3 00
Best lounging chair, Geo. S. Tompkins, Detroit.....	3 00
Best reception chair, Keck, Winterhalter & Co., Detroit.....	3 00
Best center table, Keck, Winterhalter & Co., Detroit.....	3 00
Best mantel mirror, Keck, Winterhalter & Co., Detroit.....	5 00
Best lambrequin, Keck, Winterhalter & Co., Detroit.....	2 00
Best set of chamber furniture, Keck, Winterhalter & Co., Detroit.....	10 00
Best spring mattress, Hamilton Spring Bed Co., Detroit.....	2 00
2d do., Hamilton Spring Bed Co., Detroit.....	1 00
Best mattress for bed, F. A. Decker, Detroit.....	2 00
2d do., Keck, Winterhalter & Co., Detroit.....	1 00
Best book case, C. Cevoalin, Detroit.....	3 00
Best office desk, Geo. S. Tompkins, Detroit.....	3 00
2d do., Geo. S. Tompkins, Detroit.....	2 00
Best office chair, Keck, Winterhalter & Co., Detroit.....	2 00
2d do., Geo. S. Tompkins, Detroit.....	1 00
Best desk of any kind, Keck, Winterhalter & Co., Detroit.....	3 00
Best child's carriage, F. A. Decker, Detroit.....	2 00
2d do., Freund Bros., Detroit.....	1 00
Best display of veneers, J. Becker & Sons, Detroit.....	5 00
Best display of rustic work, Wm. Adair & Co., Detroit.....	1 00
Best assortment of school furniture, Michigan School Furniture Co., Northville.....	Diploma
2d do., Union School Furniture Co., Battle Creek.....	Silver medal.

NON-ENUMERATED.

Roll top rotary desk, Geo. S. Tompkins, Detroit.....	\$3 00
Manufacture of pianos, J. Becker & Sons, Detroit.....	Silver medal
Display of invalid chairs, Freund Bros., Detroit.....	3 00
Pillow sham holder, J. J. Kelsey, Detroit.....	2 00
Exhibit of willow and rattan furniture, baskets, etc., A. Dondero, Detroit..	Diploma
Pillow sham holder, Hamilton Spring Bed Co., Detroit.....	1 00
Exhibit of a variety of miscellaneous articles of willow furniture, Alex Messmer, Detroit.....	Silver medal

L. C. HALL,

C. N. TUTTLE,

Judges.

CLASS 53—STOVES, IRON WORK, AND ORNAMENTAL CONCRETE WORK.

Best display of ornamental bracket work, J. E. Bollis & Co., Detroit.....	\$3 00
Best ornamental cast iron vase, E. T. Barnum Wire and Iron Works, De- troit.....	3 00
Best cast iron gate, J. E. Bollis & Co., Detroit.....	3 00
Best display of iron work, E. T. Barnum Wire and Iron Works, Detroit..	3 00
Best cast iron fence, E. T. Barnum Wire and Iron Works, Detroit.....	3 00
Best ornamental fountain, E. T. Barnum Wire and Iron Works, Detroit...	2 00
Best ornamental statuary, E. T. Barnum Wire and Iron Works, Detroit..	2 00
Best iron chair, J. E. Bollis & Co., Detroit.....	1 00
Best fruit and flower stand, E. T. Barnum Wire and Iron Works, Detroit..	1 00
Best display of rustic work, E. T. Barnum Wire and Iron Works, Detroit..	2 00

THOS. A. MOORE,

J. M. BONNEY,

C. W. CHILDS,

Judges.

DIVISION N—PAINTING, PRINTING, AND STATIONERY.

CLASS 56—PAINTING AND SCULPTURE.

Best bird piece in oil by exhibitor, Mrs. A. Gale, Albion.....	\$5 00
2d do., Mrs. Robert Wagner, Detroit.....	3 00
Best collection of not less than five oil paintings by a person not a dealer, H. M. Hall, Detroit.....	10 00
2d do., Mrs. A. Gale, Albion.....	5 00
Best collection of oil paintings by any dealer or association in Michigan, twenty-five or more, A. J. Brown, Detroit.....	25 00
2d do., Mrs. A. Gale, Albion.....	10 00
Best collection of water color paintings, not less than five in number, by a person not a dealer, Mrs. Robert Wagner, Detroit.....	3 00
Best display of decorated porcelain, Mrs. L. F. Margab, Detroit.....	10 00
Best fruit piece in oil by exhibitor, Mrs. A. Gale, Albion.....	5 00
2d do., Mrs. A. Gale, Albion.....	3 00
Best flower piece in oil by exhibitor, J. V. Leonard, Royal Oak.....	5 00
2d do., Mrs. A. Gale, Albion.....	2 00
Best fancy painting in oil by exhibitor, Delos Bell, Detroit.....	5 00
2d do., Mrs. A. Gale, Albion.....	3 00
Best fancy painting in water colors by exhibitor, Miss Charlotte Robinson, Detroit.....	5 00
Best historical painting in oil by exhibitor, W. W. Black, Battle Creek.....	10 00
Best historical painting in oil shown by any person, A. J. Brow, Detroit..	20 00
2d do., A. J. Brow, Detroit.....	10 00
Best landscape painting in oil of Michigan scenery, A. J. Brow, Detroit...	10 00
2d do., A. J. Brow, Detroit.....	5 00
Best landscape from nature in oil by exhibitor, Percy Ives, Detroit.....	10 00
2d do., Mrs. A. Gale, Albion.....	5 00
Best landscape in oil shown by any person, A. J. Brow, Detroit.....	10 00
2d do., A. J. Brow, Detroit.....	5 00

Best landscape painting in water colors by exhibitor, Mrs. Robert Wagner, Detroit.....	\$10 00
2d do., Miss Charlotte Robinson, Detroit.....	5 00
Best landscape painting in water colors of Michigan scenery, Mrs. Robert Wagner, Detroit.....	8 00
Best marine scene in oil by exhibitor, Mrs. A. Gale, Albion.....	10 00
2d do., Mrs. A. Gale, Albion.....	5 00
Best marine painting in oil shown by any person, A. J. Brow, Detroit.....	10 00
2d do., A. J. Brow, Detroit.....	5 00
Best oil painting by person under sixteen years old by exhibitor, Bessie M. Curtis, Detroit.....	5 00
2d do., Hattie E. Lester, Albion.....	3 00
Best portrait from life, large size, in oil, by exhibitor, L. T. Ives, Detroit.....	10 00
2d do., L. T. Ives, Detroit.....	5 00
Best portrait from life, cabinet size, in oil, by exhibitor, Percy Ives, Detroit.....	5 00
2d do., H. M. Hall, Detroit.....	3 00
Best portrait in oil shown by any person, A. J. Brown, Detroit.....	10 00
Best pastel painting of landscape, A. W. Abraham, Detroit.....	3 00
2d do., Mrs. L. H. Margab, Detroit.....	2 00
Best painting on porcelain, Mrs. Robert Wagner, Detroit.....	3 00
Best special subject in oil shown by any person, A. J. Brow, Detroit.....	5 00
2d do., A. J. Brow, Detroit.....	3 00
Best special subject in water color shown by any person, Miss Charlotte Robinson, Detroit.....	3 00
2d do., Mrs. Robert Wagner, Detroit.....	2 00
Best specimen of painting on ebonized panel, Mrs. Robert Wagner, Detroit.....	3 00
2d do., Mrs. L. F. Margab, Detroit.....	2 00
Best specimen of painting on holly, Mrs. A. Gale, Albion.....	2 00
2d do., Mrs. A. Gale, Albion.....	1 00
Best specimen of painting on plaque, H. M. Hall, Detroit.....	3 00
2d do., Mrs. Lizzie Stevens, Detroit.....	2 00
Best specimen of painting on silk, Mrs. A. Gale, Albion.....	3 00
2d do., Mrs. A. Gale, Albion.....	2 00
Best specimen of painting on shell, Miss Charlotte Robinson, Detroit.....	3 00
Best winter piece in oil by exhibitor, Mrs. A. Gale, Albion.....	5 00
2d do., Mrs. A. Gale, Albion.....	3 00
Best winter piece in oil by any person, A. J. Brow, Detroit.....	5 00
2d do., A. J. Brow, Detroit.....	3 00
Best crayon drawing of face, L. T. Ives, Detroit.....	5 00
2d do., J. J. Rice, Detroit.....	2 00
Best pencil drawing of landscape, Percy Ives, Detroit.....	2 00
Best animal photograph, A. W. Abraham, Detroit.....	2 00
Best collection of photographs, A. W. Abraham, Detroit.....	3 00
Best landscape photograph, A. W. Abraham, Detroit.....	1 00
Best portrait photograph colored, Mrs. Robert Wagner, Detroit.....	2 00
2d do., H. M. Hall, Detroit.....	1 00
Best portrait photograph, life size, A. W. Abraham, Detroit.....	2 00
Best display of gilt frames, A. J. Brow, Detroit.....	5 00
2d do., Mrs. A. Gale, Albion.....	3 00
Best display of picture frames, A. J. Brow, Detroit.....	5 00
Best specimen of bronze statuary, Detroit Bronze Co., Detroit.....	3 00
2d do., Detroit Bronze Co., Detroit.....	2 00

NON ENUMERATED.

Display of tin-types, Chas. Levy, Detroit.....	\$3 00
Panel drawing, Delos Bell, Detroit.....	2 00
Crayon drawing, Frank J. Engells, Detroit.....	1 00
Crayon drawing, Frank J. Engells, Detroit.....	1 00
Crayon drawing, Frank J. Engells, Detroit.....	1 00
Combination picture, J. Duryea, Detroit.....	1 00
Specimen of painting on satin, Miss Lizzie Stevens, Detroit.....	3 00
Velvet table scarf hand painted, Bessie M. Curtis, Detroit.....	3 00
Specimen of painting on velvet, Mrs. Robert Wagner, Detroit.....	3 00
Specimen of painting on plush, Mrs. Robert Wagner, Detroit.....	2 00

Two frames with wax cross, Alex. Messmer, Detroit.....	\$3 00
Four gilded frames with photographs, Alex. Messmer, Detroit.....	3 00

T. C. ABBOT,
J. C. HOLMES,
R. G. BAIRD,

Judges.

DIVISION O—NEEDLE AND FANCY WORK.

CLASS 58—ARTICLES OF LADIES' DRESS.

Best child's suit, Madame Hude, Detroit.....	\$2 00
Best corset, Singer Mfg. Co., Detroit.....	2 00
2d do., Bessie M. Curtis, Detroit.....	1 00
Best display of fur goods, Gustave Heine, Detroit, diploma and.....	5 00
2d do., Dickerson & Co., Detroit.....	3 00
Best infant's suit, Madame Hude, Detroit.....	2 00
Best lady's walking dress, Mrs. L. Storey, Detroit.....	3 00
Best lady's skirt, Madame Hude, Detroit.....	1 00
Best suit of under garments, Madame Hude, Detroit.....	2 00

MRS. J. A. BRISCOE,
MRS. W. H. CALKINS,

Judges.

CLASS 59—PLAIN NEEDLE AND MACHINE WORK.

Best braiding by machine, Domestic Sewing Machine Co., Detroit.....	1 00
2d do., New Home Sewing Machine Co., Detroit.....	50
Best sample of darning, Mrs. C. G. Hampton, Detroit.....	1 00
Best fine shirt by hand, Mrs. C. G. Hampton, Detroit.....	2 00
Best fine shirt by machine, Singer Mfg. Co., Detroit.....	2 00
Best gent's dressing gown, Singer Mfg. Co., Detroit.....	2 00
Best specimen of hem-stitching, M. E. Bartlett, Tomkins.....	2 00
Best specimen of ornamental work by machine, Domestic Sewing Machine Co., Detroit.....	2 00
2d do., Eldredge & Co., Detroit.....	1 00
Best pair of plain handkerchiefs by hand, M. E. Bartlett, Tomkins.....	1 00
2d do., Mrs. Mary Leslie, Dearborn.....	50
Best pair plain pillow cases by hand, Mrs. C. G. Hampton, Detroit.....	1 00
2d do., M. E. Bartlett, Tomkins.....	50
Best pair of plain sheets by hand, M. E. Bartlett, Tomkins.....	1 00
2d do., Mrs. C. G. Hampton, Detroit.....	50
Best plain sewing by machine, Eldredge & Co., Detroit.....	2 00
2d do., Singer Manufacturing Company, Detroit.....	1 00
Best plain white muslin quilt by hand, Mrs. Hiram Walton, Pontiac.....	2 00
Best quilt by machine, New Home Sewing Machine Company, Detroit.....	2 00
Best calico patchwork quilt by hand, Miss G. Knapp, North Branch.....	2 00
2d do., E. O. Bennett, Wayne.....	1 00
Best silk patchwork quilt by hand, Mrs. Thomas Swan, Detroit.....	5 00
2d do., Mrs. R. Murphy, Detroit.....	3 00
Best worsted patchwork quilt by hand, Mrs. E. Cunningham, Detroit.....	2 00

NON ENUMERATED.

Display of sewing machine work, Singer Manufacturing Co., Detroit.....	3 00
Knit quilt in cotton, S. C. Wetherbee, Detroit.....	1 00
Trimmed paper suit, Madam Kellogg, Battle Creek.....	2 00

BLANCHE P. SPENCER,
MRS. J. N. DEAN,

Judges.

CLASS 60—EMBROIDERY AND ORNAMENTAL NEEDLEWORK.

Best applique embroidery in silk or velvet, Miss Charlotte Robinson Detroit.....	\$2 00
2d do., Mrs. D. E. Jerome, Detroit.....	1 00

Best cut or tufted work, M. E. Bartlett, Tomkins.....	\$2 00
2d do., Mrs. Hiram Walton, Pontiac.....	1 00
Best specimen of chenille embroidery, Mrs. M. P. Anthony, Detroit.....	2 00
2d do., Mrs. A. P. Piper, Detroit.....	1 00
Best specimen of crewel embroidery, Madame Hude, Detroit.....	2 00
2d do., Mrs. Robert Wagner, Detroit.....	1 00
Best collection of lace work, Miss Nora Cunningham, Detroit.....	4 00
2d do., Miss Fanny Stewart, Greenfield.....	2 00
Best collection of embroidery and ornamental needle work by one person, Mrs. Ira Mayhew, Detroit.....	8 00
2d do., Miss Mira Cheeney, Detroit.....	5 00
Best specimen of darned net work, Emily J. Richards, North Branch.....	1 00
Best specimen of etching in cotton, linen, or silk, Mrs. Ira Mayhew, Detroit, 2d do., M. E. Bartlett, Tomkins.....	2 00 1 00
Best embroidered banner screen, Mrs. Robert Wagner, Detroit.....	1 00
Best embroidered bracket, Mrs. T. S. Cline, Detroit.....	1 00
2d do., Mrs. Robert Wagner, Detroit.....	50
Best embroidered chair or ottoman cover in worsted, Mrs. T. S. Cline, Detroit, 2d do., Mrs. W. E. Wyckoff, Detroit.....	2 00 1 00
Best embroidered infant's blanket in silk, Madame Hude, Detroit.....	1 00
Best embroidered infant's dress or skirt in silk, Madame Hude, Detroit.....	2 00
2d do., Mrs. M. O'Dell, Detroit.....	1 00
Best embroidered letters in cotton or linen, Mrs. E. A. Collins, Homer.....	1 00
2d do., Mrs. Ira Mayhew, Detroit.....	50
Best embroidered lady's dress in silk, Mrs. Robert Wagner, Detroit.....	3 00
Best embroidered ottoman or chair cover in silk, Mrs. A. Conant, Detroit.....	1 00
Best embroidered pillow shams, Mrs. Ira Mayhew, Detroit.....	3 00
2d do., Mrs. J. Stubensky, Detroit.....	2 00
Best embroidered piano or table cover, Mrs. T. S. Cline, Detroit.....	4 00
2d do., Mary E. Faltis, Detroit.....	2 00
Best embroidered sofa pillow in silk, Mrs. Robert Wagner, Detroit.....	2 00
2d do., Mrs. A. Conant, Detroit.....	1 00
Best embroidered sofa pillow in worsted, Mrs. F. V. Smith, Coldwater.....	3 00
2d do., Mrs. A. Gale, Albion.....	2 00
Best embroidered toilet set, Mrs. Ira Mayhew, Detroit.....	2 00
Best fire screen in silk or worsted, Mrs. Robert Wagner, Detroit.....	3 00
Best fancy pin-cushion, Mrs. Ira Mayhew, Detroit.....	1 00
2d do., Madame Hude, Detroit.....	50
Best specimen of Honiton lace, M. E. Bartlett, Tomkins.....	2 00
Best Macarrie work, Mrs. Hiram Walton, Pontiac.....	2 00
2d do., Mrs. Robert Wagner, Detroit.....	1 00
Best sample of raised work, Miss Lizzie Grix, Detroit.....	2 00
2d do., Mrs. M. O'Dell, Detroit.....	1 00
Best toilet set in lace or muslin, Madame Hude, Detroit.....	50

NON-ENUMERATED.

Worsted rug, Mrs. Ira Mayhew, Detroit.....	2 00
Specimen of lace work, Mrs. J. T. Wilder, Detroit.....	2 00
Etching on linen in ink, Miss Belle McMillan, Detroit.....	1 00
Specimen of pointe lace, Miss E. A. Clock, Detroit.....	2 00
Collection of lace work, Mrs. Ann Williams, Detroit.....	3 00
Sample of silk lace, Mrs. Susan Phelps, Detroit.....	1 00
Pair lace pillow shams, Mrs. E. Cunningham, Detroit.....	1 00
Crazy silk tidy, Mrs. E. Cunningham, Detroit.....	1 00
Lunch table spread, Mrs. F. V. Smith, Coldwater.....	3 00
Embroidered table cover, Mrs. Robert Stewart, Greenfield.....	50
Embroidered table scarf in silk, Miss Anna Metson, Detroit.....	50
Satin sofa pillow in Kensington silk work, Miss Mira Cheeney, Detroit.....	1 00
Satin cashmere shawl, Miss Mira Cheeney, Detroit.....	2 00
Embroidered tidy, Caroline Beckbessinger, East Saginaw.....	50
Darned net pillow shams, Mrs. E. A. Collins, Homer.....	50
Crazy sofa pillow, Howard D. Smith, Detroit.....	50
Darned shams, Howard D. Smith, Detroit.....	1 00
Crazy silk table cover, Mrs. W. E. Wyckoff, Detroit.....	50

MRS. LYMAN YERKES,
MRS. ANDREW McPHERSON,

Judges.

CLASS 61—CROCHET, KNIT, AND FANCY WORK.

Best Afgham robe, Mrs. W. H. Rutson, Jackson.....	\$5 00
2d do., Bessie M. Curtis, Detroit.....	3 00
Best crochet or knit bed spread, G. Rosenberger, Detroit.....	3 00
2d do., Horace P. Foust, Detroit.....	1 00
Best cotton tidy, M. E. Bartlett, Tomkins.....	2 00
2d do., Mrs. E. A. Collins, Homer.....	1 00
Best crochet or knit cloak, Mrs. C. Germer, Detroit.....	2 00
Best child's Afghan robe, Caroline Beckbessinger, East Saginaw.....	1 00
Best child's crochet or knit cap, Madame Hude, Detroit.....	1 00
Best child's crochet or knit shirt, Madame Hude, Detroit.....	2 00
Best collection of work in this class by one person, Emily J. Richards, North Branch.....	5 00
2d do., M. E. Bartlett, Tomkins.....	3 00
Best pair of crochet or knit fancy mittens, M. E. Bartlett, Tomkins.....	2 00
2d do., Mrs. M. O'Dell, Detroit.....	1 00
Best gent's scarf, Emily J. Richards, North Branch.....	2 00
Best crochet or knit hood, Caroline Beckbessinger, East Saginaw.....	2 00
2d do., Madame Hude, Detroit.....	1 00
Best crochet or knit infant's shoes, Bessie M. Curtis, Detroit.....	1 00
2d do., Madame Hude, Detroit.....	50
Best crochet or knit infant's shirt, Madame Hude, Detroit.....	1 00
Best crochet or knit leggings, Madame Hude, Detroit.....	2 00
Best crochet or knit lady's sacque, Miss Grace Knapp, North Branch.....	50
Best crochet or knit lady's shoes, Madame Hude, Detroit.....	1 00
2d do., Bessie M. Curtis, Detroit.....	50
Best pair of lamp mats, Caroline Beckbessinger, East Saginaw.....	50
Best pair of toilet mats, M. E. Bartlett, Tomkins.....	50
Best crochet or knit shawl, Miss Emma Schultz, Detroit.....	3 00
2d do., Madame Hude, Detroit.....	1 00
Best worsted tidy, Mrs. Jacob Hadley, Rochester.....	50

NON-ENUMMRATED.

Crochet quilt, Mrs. Geo. Sierwright, Detroit.....	3 00
Knit rug, Mrs. W. Whitmore, Detroit.....	1 00
Crochet pillow shams, Miss Emma Schultz, Detroit.....	50
Carriage robe, Mrs. Seth Smith, Detroit.....	1 00
Driving gloves, Mrs. Seth Smith, Detroit.....	50
Two pair of woolen stockings, Mrs. Susan Phelps, Detroit.....	50
Pair hand-made linen hose, Mrs. Sylvester Farmer, Detroit.....	1 00
Silk portiere, Mrs. F. V. Smith, Coldwater.....	5 00
Knit purse, Mrs. Robert Stewart, Greenfield.....	50
Worsted mats, Homer A. Flint, Detroit.....	50
Lady's hand-knit under garment, Bessie M. Curtis, Detroit.....	1 00
Hooked rug, Emily J. Richards, North Branch.....	1 00
Tatted tidy, Caroline Beckbessinger, East Saginaw.....	50

MISS C. VAN DYCK,

MISS IDA LEE,

Judges.

CLASS 60—HAIR, SHELL, AND WAX WORK.

Best artificial flowers in silk, muslin, paper, or feathers, Mrs. W. P. Cogan, Detroit.....	\$2 00
2d do., Mrs. M. O'Dell, Detroit.....	1 00
Best bouquet of dried grasses or flowers, Mrs. W. Prentice, Windsor, Ont.....	2 00
2d do., Mrs. W. Prentice, Windsor, Ont.....	1 00
Best display of hair work, Mrs. R. W. Allen, Detroit.....	3 00
Best display of shell work, David Fuller, Fenton.....	2 00
Best display of wax flowers, Hattie M. Chandler, Detroit.....	2 00

NON-ENUMERATED.

Display of dried flowers and grasses, Wm. Adair & Co., Detroit.....	2 00
Hair wreath, Mrs. W. P. Cogan, Detroit.....	1 00
Seed wreath, Miss Lizzie Gargrave, Detroit.....	1 00
Display of feather work, A. Dondero, Detroit.....	2 00

Show case of ostrich feathers, Kennedy & Healey, Detroit.....	\$3 00
Two embalmed flower anchors, Hattie M. Chandler, Detroit.....	3 00
Four embalmed pillows, Hattie M. Chandler, Detroit.....	3 00

MRS. B. F. BRISCO,
HATTIE L. YERKES,
Judges.

DIVISION P—MISCELLANEOUS.

CLASS 63—MISCELLANEOUS ARTICLES.

Best specimen of ground bone, Michigan Carbon Works, Detroit.....	\$5 00
Best collection of monumental work, Detroit Bronze Co., Detroit.....	10 00
Best sample of table salt, M. E. Bartlett, Tomkins.....	3 00
Best specimen of wood turning, J. L. Morrison, Detroit.....	1 00
Best wrought iron fence of Michigan manufacture, E. T. Barnum Wire and Iron Works, Detroit.....	5 00
Best work in marble, Wm. Schultheis, Detroit.....	5 00

NON-ENUMERATED.

Granite grave mark, Wm. Schultheis, Detroit.....	1 00
Display of paints, varnishes, etc., Detroit White Lead Co., Detroit.....	3 00
Life pleasure boat, Geo. W. Friend, Detroit.....	1 00
Display of harness oil and blacking, Germania Oil Co., Detroit.....	3 00
Wooden packages, James Tomlinson, Detroit.....	3 00
Lake Superior slate, Eberts Bros., Detroit.....	1 00
Iron roofing, Eberts Bros., Detroit.....	50
Corrugated iron roofing, Eberts Bros., Detroit.....	50
Patent iron shingles, Eberts Bros., Detroit.....	50
French skiff, Breener & Helmer, Wyandotte.....	1 00
Specimen of slate roofing, E. R. Davis, Detroit.....	1 00
Cases of axes, picks, tools, etc. Michigan Axe and Tool Co., East Saginaw..	3 00
American fruit evaporator, Dwight Stone, Kalamazoo.....	1 00
Stone's bleacher, Dwight Stone, Kalamazoo.....	50
Coal sifter, Mrs. S. R. Bateson, Detroit.....	50
The Pathie illuminated door plates, etc., T. B. Lawrence, East Saginaw...	1 00
Bagholder, R. D. Mead, Pittsfield.....	1 00
Patent whiffletree and tug fastener, A. A. Perkins, Detroit.....	50

FRANKLIN WELLS,
E. ANDERSON,
WM. H. VALENTINE,
Judges.

CLASS 64—HOUSEHOLD ARTICLES.

Best assortment of wire ware, E. T. Barnum Wire and Iron Works, Detroit	\$3 00
Best carpet sweeper, Alex. Meston, Detroit.....	1 00
Best clothes dryer, Hamilton Spring Bed Co., Detroit.....	50
Best specimens of dish covers, E. T. Barnum Wire and Iron Works, Detroit	1 00
Best six mops and handles, A. T. Garretson, Detroit.....	50

NON-ENUMERATED.

Fruit and vegetable color setter, J. C. Deuel, Reynales Basin, N. Y.....	1 00
Slate laundry tub, Eberts Bros., Detroit.....	1 00
Set of polishing irons, Alex. Meston, Detroit.....	50
Repair pieces of wringer, fluter and sweeper, Alex. Meston, Detroit.....	50
Clothes dryer and tent combination, Hamilton Spring Bed Co., Detroit...	1 00
Bush safety bolt, J. D. Bush, Detroit.....	1 00

FRANKLIN WELLS,
E. ANDERSON,
WM. H. VALENTINE,
Judges.

DIVISION Q—CHILDREN'S DEPARTMENT.

Best specimen of hand sewing, Maud Kinney, Detroit.....	\$2 00
Best specimen of machine sewing, Emily McBride, Detroit.....	1 00
2d do, Maud Kinney, Detroit	50
Best patchwork quilt in silk by hand, Florence E. Dixon, Detroit	2 00
Best specimen of painting on satin, Bessie M. Curtis, Detroit.....	1 00
Best collection of pressed flowers, M. E. Bartlett, Tomkins.....	1 00
Best sample of jelly, M. E. Bartlett, Tomkins.....	1 00

MRS. A. E. WING,
MINNIE H. BROW,
Judges.

PRACTICAL ENTOMOLOGY.

NOTES FROM THE ENTOMOLOGICAL LABORATORY OF THE MICHIGAN AGRICULTURAL COLLEGE.

BY PROF. A. J. COOK.

THE "BLACK ARMY-WORM."

Agrotis fennica, Tauscher.—Family *Noctuidæ*. Order *Lepidoptera*.

During the past few years, many new insect pests have crowded upon us. Hardly a season passes by, during which some part of our country is not devastated. One year the meadows and clover fields of New York are stripped of their herbage; then the strawberry fields of Illinois are pilfered of their delicious fruit. Thus every season comes freighted with new evil. The present summer is peculiar in ushering in two serious pests, neither of which has ever before attracted the least attention anywhere in the country. What is most remarkable, both of these new raiders made their advent in Michigan. One of these new pests has been known as a rare moth, and has been taken in California, the Northern and Eastern States, and in Canada. This year it swarms down upon Michigan in such multitudes as to earn and receive the sobriquet of Army-worm. The other insect is a beetle of the weevil family. This I have known to be common in Michigan for 15 years; yet no one has complained of it as an enemy; indeed, its habits as a larva were all unknown. This year it girdles the crown of the strawberry so as to do no inconsiderable mischief. Why insects usually rare should all at once come in multitudes, and why well known insects should suddenly change their habits, are questions which as yet we may hardly answer with certainty. The greater abundance may result from favorable seasons, in respect to climate and absence of insect and bird enemies; while changed habits may result from a scarcity of native food plants, consequent upon the cultivation of the soil by man.

The Black Army-worm, to use a name given by the gardeners where this new enemy has wrought its mischief, has been very common and destructive at Bay City, Portsmouth, Saginaw City, on the shore of Lake Huron as far north as Harrisville, and also on the Lake Michigan shore at Traverse City. More lately I have received this same insect from Mr. L. S. Abbott, of the Lewiston, (Maine), Journal. Mr. Abbott states that the insect is new to Maine,

and has been quite destructive at Waterville. While the larva seemed to prefer strawberry, it ate readily of other plants, especially pear and asparagus. The name Black Army-worm is not inappropriate. The velvety-black stripes along the body of the larva, especially till after the last molt, are so conspicuous that the larvæ appear very black, and when I say that in a meadow that I visited at West Bay City, the caterpillars were so numerous that to step was to kill a score, I make it clear that the word Army-worm is no misnomer.

The larvæ feed mostly by night and hide in the grass, just at the surface of the earth, or under some clod, by day. On damp, cloudy days, however, like the other species of this genus—cut-worms—they not infrequently work by daylight. Their food consists of nearly every green thing: onions, peas, buds of fruit trees, every garden flower and plant, grass, clover, and even dock and mullein were made to contribute to their nourishment. They were especially harmful to strawberry vines. In Bay City some of the gardens were utterly stripped of the early vegetables.

The larvæ were first observed about April 20th; but some of these were certainly three weeks from hatching. On May 20th, I found some about half grown; others fully grown. After June 1st, very few larvæ were to be found. The pupæ were found at varying depths in the earth, from two inches to a foot. The pupa stage lasts two or three weeks. Thus the moths will be coming from the earth from June 15th till the middle of July.

DESCRIPTION.

I have been unable to secure the eggs, and so cannot describe them. It is probable that they are laid on grass and other plants at or near the ground.



Fig. 1.

The larva (Fig. 1) has three velvety-black, longitudinal lines of about equal width, one on the back and one on each side. Between the dorsal and each lateral line, is a light line which is as wide as the black lines. The upper half of this light-colored line is thickly mottled with white and black spots, the white color prevailing, and the white spots being largest below. Below the mottled line, we find a narrow black line; and, below this, a narrow white line. Close examination shows that both these lines are broken in many places, white interrupting the black line, and *vice versa*. Below each lateral black line is another light-colored line, not quite as wide as the black lines. These light lines have a central line of black, which, however, is much interrupted by white. The white margins of these lines are somewhat broken with black. The upper light lines do not extend to the cervical shield or to the anal plate. In some specimens the white mentioned above is quite yellowish. Beneath, the body varies much, from nearly black, gray, or brown, to olivaceous. The sides of the head, mouth-parts, legs, and anal area are brown. The top of the head, cervical shield, and anal plate are black, the two former having a white central line, which in case of the head is forked above. There are scattering white hairs all over the body, which are most numerous on the under side and on the legs. After the last molt, the black is replaced by a grayish-brown, the white is more yellowish, and



Fig. 2.

the color beneath decidedly olivaceous. When mature the larva is 3.75 cm., or $1\frac{1}{2}$ inch long. The pupa (Fig. 2) is 1.9 cm., or $\frac{3}{4}$ of an inch long. Except that it has a terminal forked spine, it is in no wise peculiar.

The moth (Fig. 3) which was kindly identified for me by my friend, Prof. J. A. Lintner, looks strikingly like many of our common cut-worm moths.



Fig. 3.

third of the distance from this spot to the internal angle, a dash and crescent below and within the inner or rounded spot, and a row of dots near the outer margin, are black. The inner rounded spot is



Fig. 4.

slightly oblong, and is often nearly white, though sometimes it is yellowish, and at others, lead-colored. Two wavy darker lines cross the brown internal margin of the wings. The secondary wings and abdomen are gray. Within a narrow gray margin the secondary wings are bordered with a dusky band. A very common variety, of which we illustrate the wings of one side at Fig. 4, is very dark. In these the brown, with the exception of the reniform spot, is all replaced by a dark hue approaching lavender.

REMEDIES.

We found several species of ground beetles (*Carabidæ*) and the Soldier Bug (*Arma spinosa*) worthily employed in ridding the gardens and meadows of this plague. I also reared a parasitic fly, a new species which Mr. S. W. Williston has kindly described under the name *Scopolia sequax*. We also reared pupae of an ichneumon fly, but failed to get any of the imagos. No doubt these natural enemies will greatly thin out these insects before another season. I found I could readily poison the pests by the use of the arsenites; but this was of no immediate service, as, if we poisoned a thousand, ten thousand stood ready to take their places. Coal-tar water was found by Mr. Grinnell, of Bay City, to repel the insects. I have no doubt that a liquid made of soft soap one quart, crude carbolic acid one pint, and water two gallons, would have the same effect. Mr. Grinnell found that his chickens took to the caterpillars amazingly; and while chickens are not the best helpers in a garden, Mr. Grinnell wisely concluded he would get some return from this mammoth plague, if nothing more than some fat chickens. Whether this insect is double-brooded or not, remains to be seen.

Scopolia sequax, Williston, sp. nov.

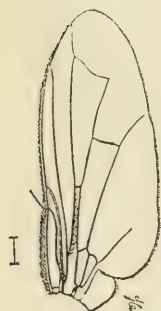


Fig. 5.

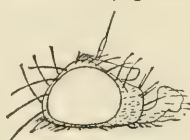


Fig. 6.

Fig. 5 and 6. Female. Length five mm., deep shining black with black bristles; wings faintly tinged with blackish, a little more evident in front and on the cross-veins, the first vein without bristles, third vein with bristles as far as the anterior cross-vein. Deep shining black; less shining on the front, the sides of which and the face are thinly covered with silvery white dust. Antennæ black, the third joint five or six times as long as the second joint, of considerable breadth, the lower anterior angle nearly rectangular, the posterior one rounded; arista distinctly jointed, the second joint considerably longer than the first, but both short, the third joint considerably thickened on the

proximal third, then rapidly narrowed and bristle-like. Sides of the face very narrow, with five rather strong bristles, situated near but not upon, the border of the facial grooves. Dorsum of thorax wholly shining black, without gray dust, with rather strong bristles. Pleuræ faintly grayish dusted. Scutellum with four strong bristles, directed backward. Abdomen ovate, shining; the second, third, and fourth segments in the middle, each with two pairs of rather strong bristles, forming two longitudinal rows, the first pair situated a little before the middle, the second pair a little before the posterior border of each segment; on the lateral borders of each of these segments there are also two, less strong, bristles, situated as the median ones are, but forming a single row; fifth segment and below near the anal orifice with numerous bristles. Legs black, not shining, with numerous bristles. Tegulæ white. Wings nearly uniformly lightly tinged with blackish, more distinctly so along the costal border and the cross-veins; veins dark luteous, except the two outer cross-veins which are black; costa to a little beyond the termination of the second vein, and the third vein as far as the anterior cross-vein, with short black bristles, the first vein bare; cross-vein at outer part of the first posterior cell considerably bent and its anterior part directed outward, posterior cross-vein gently sinuate.

One specimen, reared by Professor Cook from the larvæ of *Agrotis fennica*, an immature specimen without wings, sent with this has the same structure of the antennæ; whether it belongs to the same species or not it is impossible to definitely say. Brauer, in his recent valuable review of the larval forms and habits of diptera, makes no reference to this genus, and the only reference that I can find to the habits of any species is the following from Schiner (*Fauna Austriaca*, i, 539): "I possess one specimen of *Scopolia* reared from an *Agrotis* larva; nothing further concerning the metamorphoses is known to me."

THE STRAWBERRY CROWN GIRDLER.

BY CLARENCE M. WEED.

Otiorynchus ligneus Oliv. Order, *Coleoptera*. Family, *Otiorynchidae*.

A small pinkish or white footless Grub girdling the crown of Strawberries in May or June.

This new pest, for which I propose the above name, was first noticed in the college strawberry beds on June 8, by Mr. James Troop. As the larva and its mode of working are similar to the crown borer, it was at first supposed that this famous pest had been introduced, but an examination at once showed that it was a different insect, nor could it be referred to any other species known to attack the queen of summer fruits. Its identity remained in doubt, until on June 11th, a newly transformed beetle was found which was kindly determined by Mr. E. A. Schwarz of the Department of Agriculture as *Otiorynchus ligneus*.

NATURAL HISTORY.

It seems probable that the insect hibernates in the beetle state, but whether it also passes the winter as a larva is not known. A near relative, (*Otiorynchus sulcatus*) which injures strawberries in Europe hibernates as a

larva and emerges as a beetle in April or May, being single brooded. Whether our species is single or double brooded is not as yet known, as is also true of the time at which the eggs are laid and the period required for the larva to develop. We do know that the larvæ are full grown from the middle to the last of June. The latest date at which the larvæ were found was June 29. They eat the crown of the plant but the mode of working differs considerably from that of the crown borer. Instead of confining itself to the inside of the crown and excavating that as does the crown borer it seems to prefer the outer portion. It is on this account that the name crown girdler is proposed, to distinguish it from the numerous other species that infest the roots and crowns of strawberries. In many cases, however, it eats horizontally through to the center of the crown. Its presence may be detected by the powdery brown droppings.

As soon as the larva attains its growth it leaves the crown and forms an earthen cocoon in the surrounding soil. About two days later it becomes a pupa which in eight or ten days emerges as a beetle. I have taken the full grown larvæ, pupæ, and beetles from around the same plant at the same time.



Fig. 7.

LARVA:—All of the larvæ which were seen eating were of a pinkish tinge, but when compelled to fast became white. The full grown larva (Fig. 7.) is three-eighths of an inch long by one-eighth of an inch wide; white, except the head, which is light brown, with the mouth parts darker and the edges of the jaws black. The head is smooth except for four transverse rows of light brown hairs. The body is arched; on each segment is a row of reddish brown hairs, curved at the tip on the back, but shorter and not curved on the under side. The dorsum or upper part of each ring is divided into three transverse lobes or folds, all except the first and the next to the last of which are smooth. On the under side of the first three segments are tubercles in place of feet; these possess stiff hairs. On the sides of each segment are two triangular tubercles, each bearing two hairs, one of which is but half as long as the other. A longitudinal fissure separates the upper row of tubercles from the lower.

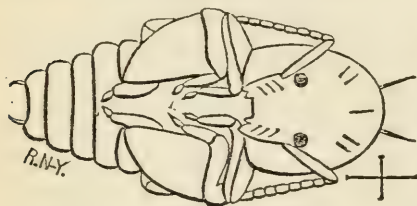


Fig. 8.

PUPA.—When first transformed the pupa (Fig. 8) is pure white, three-eighths of an inch long by two-eighths of an inch wide. The head and snout are bent against the breast, the latter not quite twice as long as wide, tapering slightly towards the tip, the jaws plainly visible. The肘ed antennæ extend to the base of the wing cases; the abdomen terminates with a pair of incurved hooks. On each segment of the head and thorax is a transverse row of spinous reddish brown hairs terminating by recurved hooks. On the outer end of each femur (thigh) is a pair of similar spines, the inner but half as long as the outer. On each segment of the abdomen is a transverse row of reddish brown awl-shaped bristles.

A day or two after transforming the black eyes show through the pupal envelope at the base of the snout, and in a few days more the mouth parts and the legs become brown. In about eight days the wing cases develop, and the body becomes light brown, which in a day or two changes to dark brown.

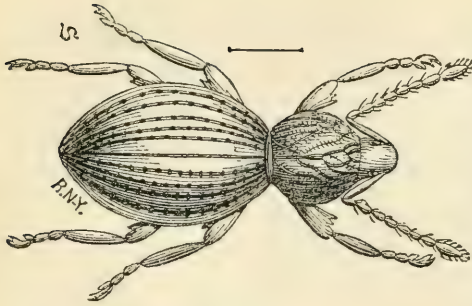


Fig. 9.

IMAGO.—The only description in American entomological works is the following by Dr. G. H. Horn, taken from the proceedings of the American Philosophical Society, vol. xv., p. 61: "*Otiorynchus ligneus* Oliv. *Ent. v. 83, p. 378, pl. 31, fig. 473*. Form oblong, color piceous, shining. Rostrum flat, emarginate at tip, surface very coarsely and closely punctured, between the eyes a deep puncture.

Thorax nearly spherical, truncate

at apex and base, surface tuberculate (at middle the tubercles become confluent in rows with deep sulci between them), each tubercle punctured at summit and bearing a short hair. Elytra oval, striate at the sides, striae obsolete on the disc and with coarse punctures closely placed, intervals flat on the disc and feebly muricate, at sides moderately convex and slightly tuberculate. Legs piceo-rufous, femora clavate, sinuate near the tip and with a moderately strong tooth bearing a denticle on its free edge. Length .20; 5 mm.

"This is the smallest species which has occurred with us, and may be easily known by the femoral armature, and the nearly spherical thorax with its peculiar sculpture."

GEOGRAPHICAL DISTRIBUTION.

Dr. Horn states that the species occurs in the New England States, but it doubtless has a much more general distribution. On this subject Mr. E. A. Schwarz kindly writes: "The species ranges from the New England and northern portions of the Middle States westward to Minnesota and Iowa. Its southern limit I am unable to trace, but it certainly does not go very far south. From my own experience I know that the beetle is very common at Cambridge, Mass., and Detroit, Mich., and that I never met with it here at Washington. In Europe the species ranges from Spain to France and England, but it occurs also, though rarely, in Italy and Southern Germany." Mr. H. Garman informs me that he has never collected the species about Normal, Ill., from which fact we may infer that it does not extend very far south.

FOOD PLANTS.

Prof. Cook has found the beetles feeding on the leaves of borage; doubtless they will be found to feed upon many other kinds of plants as well. It seems probable that the larvæ feed on other plants than the strawberry as I have found the beetles in abundance in fields at some distance from either wild or cultivated strawberries. As the beetles cannot fly it is probable that they lived on other plants. This probability is strengthened by the fact that closely related species live on a variety of food plants.

PAST HISTORY.

Absolutely nothing seems to have been known of the earlier stages of the insect heretofore. According to Mr. Schwarz, the first mention of the

species as occurring in America is that in Crotch's check list of North American coleoptera, published in 1873, but it was known to collectors long before. Prof. Cook informs me that he captured it on the college grounds more than fifteen years ago.

Prof. J. A. Lintner writes that in 1878 a house which had been closed all winter when opened in April was found to be swarming with beetles of this species. Where they came from or what they were attracted by is not known.

DIFFERS FROM THE CROWN BORER.

The larva of this insect very much resembles that of the crown borer (*Tyloclerma fragariae*) except that the former is slightly larger. But the differences in the pupa and imago are very marked. The most striking difference perhaps is in the antennæ; in the crown borer they are straight with joints of nearly uniform length, while in the crown-girdler they are elbowed, with the first joint much longer than the others. Then, too, the former goes through its metamorphoses in the excavated crown while the latter pupates in the earth about the crown. These differences together with the different modes of working, and times of development afford no excuse for confounding the two insects.

There is another insect which works in the crowns of strawberries which might be confused with the crown-girdler; it is the crown-miner (*Anarsia lineatella*). This is the caterpillar of a small moth belonging to the family *Teneidæ*, which mines the crowns in all directions. It can easily be distinguished from either the crown borer or crown-girdler by the possession of six true legs, and a number of prolegs.

FAMILY RELATIONS.

The strawberry crown-girdler belongs to the family *Oliorhynchidæ*, one of the principal families of the great group *Rhyncophora*; a group which consists almost wholly of the insects of the family *Curculionidæ* or snout beetles as formerly considered. To this group belong the famous little Turk or plum curculio, the plum gouger, the pea and bean weevils, the potato stalk weevil, the white pine weevil, and many other of our worst insect pests.

A species of the same genus (*O. sulcatus*) often injures strawberries in Europe by girdling the crown in a manner similar to that of the species now under consideration. It feeds on several other kinds of plants in the same way, among them may be mentioned raspberries and various garden crops. In the perfect state the insects devour the foliage of a large number of vines and plants often doing very serious injury, especially to grapes. This species has been introduced into America, being found in several eastern States, but does not seem to have been as yet recognized as a pest. It is figured and described in Prof. S. A. Forbes's report as State Entomologist of Illinois, for 1883, p. 177.

NATURAL ENEMIES.

As yet no parasites have been bred from these insects, although a great many have been confined for the purpose. The only insect enemies so far discovered are the predaceous beetles of the family *Carabidæ*; a number of species of these were captured in the earth about the roots of the berries and also under the mulch between the rows. One of them was confined over night in a bottle in which a pupa of the weevil had been placed; the next morning no trace of pupa was visible.

Birds, toads, and frogs are also of great service in checking the increase of these pests. I have repeatedly found them in the stomachs of crow-blackbirds, robins, and other species of birds. Immense numbers are eaten by toads and frogs. Out of the stomach of a single toad I have taken eight whole beetles and numerous fragments of others. I have also found them to be one of the commonest elements in the food of our two most abundant species of frogs, *Rana halerina* and *R. clamitans*. In a single stomach of the green frog (*R. clamitans*) five of the beetles were found. The skunk is also a great enemy to these insects. In the fecal mass of one of these mammals found in the college garden, the remains of more than 200 of these weevils were counted.

REMEDIES.

Mr. Troop found that bisulphide of carbon, as also the kerosene and soap emulsion would destroy the larvæ and pupæ. In some cases these might be advantageously used, but for large patches in matted rows their application would seem impracticable.

Probably the most efficient and practicable remedy will be that of plowing up infested fields at times when the larva are only partially developed. In the present state of our knowledge of the life history of the insect, about the middle of May would be the most advisable time. Inasmuch as the beetle cannot fly its distribution in large numbers can thus be easily prevented. No plants from an infested field should be used to start a new plantation, as it would be almost impossible to prevent the introduction of the pest in one of its four stages of egg, larva, pupa, or imago.

BARK LICE.

BY PROF. A. J. COOK.

The present season (1884) is very remarkable for the abundance of large bark or scale lice. The maple Tree Bark Louse (Fig. 10) *Pulvinaria innum-crabilis*, Rathvon, has been so numerous all through Michigan, Illinois, Indiana and Ohio, as not only to attract

general notice but to cause wide spread alarm. This insect is most abundant on soft and hard maples, but is found also on the grape vine, basswood, elm, and sparingly on other trees. The genus *Pulvinaria* includes those species of bark lice which secrete a mass of cottony fibers which serve as a nidus for the eggs. Another louse, a species of *Lecanium*, probably *Lecanium til-ice*, Fitch, infests the basswood. This is even larger than the scale louse on the maple. I find similar lice to this last on the elm, the white ash, the hickory, the bitternut, the walnut, sassafras, the tulip, and several other

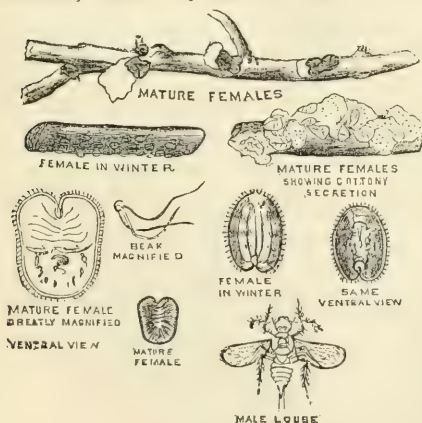


Fig. 10.

trees. The mature scales vary on the several trees. Those on the hickory, elm, and butternut are smaller; those on the white ash and hickory are very

convex; but from the great similarity of the newly hatched lice I am inclined to the opinion that they are all the same species, and are only modified in form and size by the kind of food they take. Close attention through the season will determine this point.

The natural history of these lice is as follows: In May and June the large brown scales—the mature lice, all of which are females—are seen on the under side of the branches of the trees. These scales are brown, usually oblong, though occasionally they are nearly hemispherical, and always quite convex. On the hickory the scales are very convex, and appear as deep cups upon removal from the twig or branch to which they are fastened. As already stated, we find a white, cotton-like mass under the maple scale louse, which serves to hold the eggs; as these scale-like cups are removed, they leave a white spot on the twig. The size of the scales varies much, not only on different trees, but even on the same tree. The largest scales on the maple and bass-wood measure in length from five to eight mm. (1-5 to 1-3 of an inch), and are usually less in width, though the base of the scale is frequently circular instead of oblong.

Under each scale in May and June we find from 700 to 1,000 small, white, oblong eggs. These are very minute, less than three mm. long, and a little more than half as wide. As they fall on a dark surface they appear like flour, but when magnified their real nature is plainly evident. Under a single scale of each of the maple, the bass-wood, and the ash louse, I counted upwards of 800 of these eggs.

In June and July these eggs hatch. I find that in the maple louse they are often as much as three weeks hatching from a single scale, and on all the trees they are from three to four weeks hatching—that is, it will be three or four weeks after the first eggs hatch, before all are hatched out.

The young lice which come forth from the eggs in the latter days of June and in early July are yellow, oblong, and when first hatched a little more than 4 mm. long, and a little more than half as wide as long. A slit marks the posterior part of the body, from which passes two hair-like stylets, which are a little more than half as long as the body. The eyes and six jointed antennæ show plainly. The latter have one hair projecting from the inside of the first, second, and fourth joints and several from the last joint, one of which is considerably longer than the others. The several joints of the legs are plainly marked, and the two jointed tarsi, and claws are distinctly visible. A complete row of marginal hairs is found in all the young lice. The fact that all the young lice, except the ones from the scales with the cotton like mass, are so exactly alike, makes me conclude that all are of the same species.

Very soon after hatching the young lice settle down as squatters on the leaves, usually on the under side, where they insert their beaks, which are long, triple, thread-like organs, and begin to pump out the sap and vitality from the trees. The young lice, as soon as they thus locate, become more flat, transparent, and of a lighter color. I find they may change their position on the leaves, even after they settle down as confirmed sappers, but I think they do not move much. Some time after they commence their life's work of pumping up sap they drop the anal stylets. If removed at this time from a leaf the long triple-haired beak is readily seen.

Along in the fall, before the leaves drop from the trees, the lice forsake the leaves and fasten to the under side of the branches and twigs. They are now considerably larger, but the slit at the posterior extremity is still plainly visible.

With spring there seems to come new life and vigor to the lice. If we may judge from the rapid growth in April and May, and also from the hundreds of eggs which each louse produces, we must conclude that at this time the lice are serious pests, doing no inconsiderable injury to the trees; especially when there are hundreds and thousands of them, so thick indeed that they overlap each other like shingles on a roof, as is often the case, especially with the maple bark louse.

At this time, the lice secrete a copious shower of nectar—the so called “honey dew”—which so thickly coats the upper surface of the leaves of the trees that they appear as if varnished. This unctuous sweet also falls to the ground and coats the grass and stains the sidewalks. This nectar attracts bees, wasps, flies, and other sweet-loving insects. This is especially enticing to the bees at such times as they can not gather from flowers, and enables them to fill their hives between the fruit bloom and the white clover. This secretion of such a large amount of sweet must be quite a serious drain on the vital energies of the scale lice, and as we believe that no such physiological activity is purposeless, it is interesting to cast about for the compensation which the bark lice receive for this bounteous gift of sweet. From what has already been said, we see that the lice early become stationary, and so there is very little time that they can scatter from tree to tree, and, indeed, at this early date these wee insects move only by use of their small legs, and so could hardly get, unaided, from one tree to another. Just, however, as the minute lice are rapidly running from twig to leaf, the bees and other insects are lapping up the nectar, and many of the wee lice will run upon them, and so the bees will become the agents to distribute the lice to other trees. It is more than likely too that the presence of the bees and wasps keeps predacious insects away which might otherwise prey upon the lice. We shall see in the sequel that even these little lice do serve as food for other insects. We see then that the nectar is of vast indirect service to the lice; it aids in colonization, and attracts sentinels which serve to protect the lice.

THE MALES.

Some of the scales as seen on the leaves in July—as shown by Miss Emily Smith in the case of the maple bark louse—*American Naturalist*, vol. 12, p. 655—become, narrower, lighter colored, and more convex than the others. These are to produce males. The males come forth in August. They have (Fig. 10) two wings and fly about the trees with great rapidity, and are not found after early September. Coition then takes place, when the males die, while the females continue to sip, grow, and destroy, and do not deposit their eggs till the following May. The males have well developed antennæ which are ten jointed and hairy. The abdomen terminates in a tubercle, beside which are seen the longer setæ.

REMEDIES.

It has often been noticed that these bark lice after being very common, will suddenly disappear, even though no effort is made on our part to destroy them. This riddance is doubtless owing to the agency of several insects which destroy the scale lice and their eggs. Mr. C. M. Weed and myself have discovered several insect enemies preying upon these scale lice, some of which seem to have been previously unnoticed. An undescribed chalcid parasite of the genus *Encyrtus* was reared from the species of *Lecanium* on the red ash (*Fraxinus pubescens*). Only one specimen of this was taken.

A large number of a small, shining blue chalcid fly were reared from the coccids. Mr. L. O. Howard has named this *Pachyneuron altiscuta*. He writes me that the only recorded instance of the rearing of a species from this genus which he can find, is the case of *P. aphidis* Bouché, bred by Reinhard from an Aphis.

The following is the original description of the genus, kindly sent me by Mr. Howard:

GENUS VIII. PACHYNEURON, WALKER.

Caput magnum, thorace latius; oculi mediocres; *maris* antennæ filiformes, 13 articulatae; 1us elongatus; 2us cyathiformis, subarcuatus; 3us et 4us minimi; 5us et sequentes ad 10um aequales, lineares; clava elongata acuminata, articulis 9^o et 10^o longitudine æqualis; *fem* antennæ subclavatae, corporis dimidio longitudine æquales; articuli post 5um longitudine decrecentes; clava elongato-ovata; mandibulae arcuatae, dentibus 4 acuminatis armatae; dentes 2 interni minuti, approximati; maxillae elongatae, externe ciliatae; palpi maxillares filiformes; articuli 1us et 2us aequales; 3us paullo longior; 4us elongatus, acuminatus; mentum elongatum, angustum; labium latum, transverse lineatum, anticé rotundatum; palpi labiales articulis subaequalibus 3^o acuminato; prothoracis scutellum brevissimum; mesothoracis scutum breve; suturae laterales vix conspicuae; paraptera et epimera majuscula; scutellum sat magnum, acinatum; petiolus brevissimus; *maris* abdomen elongato-ovatum, depressum; segmentum 2um elongatum; sequentia breviora; *fem* abdomen fere rotundum, supra depressum, subtus convexum; pedes graciles; tibiae rectae; alae anticae nervus solitus quæ cum costa concurrit incrassatus. (Entomological Magazine Vol. 1 (1833) p. 380.

Pachyneuron altiscuta Howard is shining blue, with legs, except femora, which are dark, antennæ and eyes light. The length is 2 mm. (.08 of an inch). The head is about half as long as the thorax, while the antennæ, thorax, and abdomen are about equal length. The wings are as long as thorax and abdomen together, while the ovipositor is two-thirds as long as the abdomen. The antennæ are thirteen jointed. The 1st is long curved, 2nd short curved, enlarging towards tip, 3rd and 4th small, 5th to 10th equal in size and length grooved longitudinally, and slightly separate. The last three are contiguous, forming the club which tapers to tip. The head is deeply emarginate posteriorly.

The costal vein of the anterior wing has a break just beyond which it is decidedly broader as far as the branch, which is as long as the broad portion and knobbed. The costal vein of the secondary wing has an angle at its middle, which points forward. The wings are very hairy except at base where they are nearly bald, and they are margined with coarser hairs. The abdomen is peduncled. The male differs little from the female, except in the sexual organs.

We also found the pupa of a heteropteron feeding on the eggs. This insect is only a mm. in length, has red eyes, four jointed antennæ, and is of a yellow color.

We discovered the larva of a lady-bird beetle, and of a syrphus fly feeding upon the eggs. Many of the scales are also attacked by a small white fungus, which appears as a small spike, several of which will be found on a single scale. All such scales failed to develop to maturity, and failed to produce eggs. These several enemies will, of course, serve to hold this pest in check.

ARTIFICIAL REMEDIES.

I have tried, quite thoroughly, several insecticides. I find nothing equal to the kerosene mixture. Lye and even soap solution will destroy the young lice, but not so surely as the kerosene emulsion. I have also tried kerosene and milk, but do not like it as well as the kerosene and soap. Any kind of soap may be used. I have found the following *very efficient*: One quart of soft soap and two gallons of water are heated to the boiling point, when one pint of kerosene oil is immediately stirred in and all well mixed.

This is doubtless the best way to prepare kerosene emulsion, and thus prepared it is very valuable as an insecticide. When applied to foliage this does not seem to injure it; in fact, I have sometimes thought it was beneficial to the plant, aside from the effect it had in killing insects. In applying this to the scale lice it should be thrown on with considerable force. This is true in case of all insects. If we turn the liquid on with a sprinkler it does not reach all the insects, at least so as to destroy, while if forced on as a fine spray it reaches all and carries death along with it.

To apply the liquid a common force pump or a fountain pump serves well. The cyclone nozzle, invented by Dr. C. V. Riley, throws a fine spray, and uses the material effectively and economically. The Woodason spray bellows has the same to recommend it. With it I have sprayed quite a large tree with a pint of liquid.

In fighting these bark lice the sooner the application is made after the lice are all hatched the better. I have found that the kerosene mixture applied to the young lice killed every one, while if applied after a few weeks the effect was not so great unless more of the liquid was used.

If it is desired to kill the mature lice in April and early May, when the scales are so plainly visible underneath the branches and twigs of the trees we must resort to other means. I have found that by use of a broom with a long handle, dipped in soap suds, lye, or the kerosene mixture, I could soon rub off the scales and thus destroy millions of eggs in a very brief time. I did not succeed in killing these mature lice by simply spraying them. President Edward Orton writes me that in Columbus, Ohio, where these lice have been very injurious to the maples, both the mature lice covering the eggs as well as the young lice may be killed very quickly by turning on to the tree, the hose from the city water works. In cities this will be an easy cure.

Unless the natural enemies soon extirpate these lice it will pay well to fight the lice as suggested above. The absorbing of the sap by the millions of little suckers will soon devitalize and ruin the trees. The expense of destroying the lice is not great, as such trees as our ordinary shade trees are rapidly treated. By use of a wagon to draw the liquid, and a force pump fastened to the barrels containing it, and a fine rose or the cyclone nozzle the work is rapid and effective, while the cost of the liquid is very slight indeed.

SECRETION OF NECTAR.

Another feature of these lice is not without its practical significance. I refer to the nectar which they secrete. When very abundant as they have been the past season (1884) in several parts of the country, the bees gather large quantities of it. The flavor of the honey if there is not too much of this secretion is not unpleasant. While the fact that the bees are so actively employed in storing all through May, leads to rapid breeding. So that there are very populous colonies at the dawn of the clover season. In case these

insects are very abundant the honey should be thoroughly extracted at the dawn of the clover bloom, so as to secure this superexcellent honey free from taint and uncolored from this louse nectar which is considerably darker than is the clover honey. It will be necessary to watch closely during the clover bloom, as if the nectar fountains of these blossoms are dried up from cold or wet, the bees will almost surely go to the so called honey dew again. I have been asked several times if this secretion would be a fit winter food for the bees. If the taste is pleasant and not bitter or fungent, and if freely capped over by the bees, I should not hesitate to leave it in the hive. If on the other hand it is unpleasant to the taste, and especially if the bees refuse to cap it over, I should fear to have it in the hive in winter. I have considerable honey which is strongly flavored by this nectar. I have asked many persons to sample it and I have yet to hear the first criticism as to its quality. I should not hesitate to feed this to my bees for winter. I have letters from persons who complain of this nectar in their hives, as bitter and nauseating; such honey should be carefully kept from the bees in winter.

PLANT LICE—APHIDES.

The present season has been especially noticeable for the abundance of plant lice, no less than bark lice. Many fruit and shade trees in May and June had their foliage and green twigs literally covered with the lice. We have carefully watched to see if M. Lichtenstein's theory of migration to the roots of plants explained the rapid thinning out of these lice in late June and July. Tar about the tree trunks caught no lice, nor do we think the lice dropped from the trees. We think that the coccinellidæ larvæ, and syrphus fly larvæ were sufficient to account for this happy riddance. Five or six of these predaceous larvæ would be found on a single leaf, dining on the lice, and their habits indicated good appetites. We are certainly more deeply indebted than we know to these insect-eating larvæ. They save many a tree and shrub from total destruction from these plant lice sappers.

INSECTICIDES.

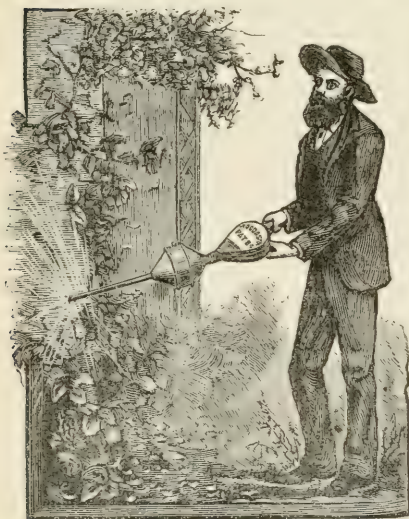


Fig. 11.

We tried pyrethrum (Buhach) as a powder, which was applied by use of the Woodason bellows (Fig. 11), which serves admirably for this purpose; pyrethrum (Buhach), mixed in water—a tablespoonful to two gallons of the liquid—which was applied by use of the Woodason spraying bellows; kerosene and sour milk, one to ten, which was thoroughly mixed; and kerosene and soap emulsion as already described. The spraying bellows we find very excellent, as it is so economical. One pint of the liquid would answer for quite a sizable tree. All of these substances were of value in killing the lice; but the pyrethrum was less effective than was the kerosene. In fact, it seemed less effective than it did last year, and I think it possibly lost some of its strength, though I kept it in

a tin can with a cover that screwed on. The two kerosene liquids both killed the lice most thoroughly. Indeed, after their use it was hard to find a live louse. The foliage, however, when the soap liquid was used, seemed much brighter than did that treated with the milk. Indeed, I think this soap and kerosene mixture applied with a force pump, with a cyclone nozzle, or by use of a spraying bellows, so that it surely is dashed against the insects, is going to prove one of our best insecticides. The foliage brightens up at once, as if the bath was most agreeable and life giving.

Prof. W. W. Tracy reports that bisulphide of carbon, which we have found so effective in our battle with such insects as the cabbage maggot, that work underground, is not effective in clay soil, and that it does sometimes injure very vigorous, rapid growing plants. We have not noticed any harm from its use, but we have tried the kerosene and soap mixture with great success. It kills the insects and does no injury to the plants. This is also cheaper and more easily procured than is the bisulphide. The fact, too, that this is non-explosive is in its favor. Carelessness might cause serious injury from the presence of the bisulphide. We have invented an instrument to apply such a mixture.

It is possible that by use of this instrument and the kerosene and soap mixture, the work of fighting successfully the old peach borer will be considerably lightened.

INSTRUMENT DESCRIBED.

Take a $1\frac{1}{4}$ inch gas pipe ten inches long (Fig. 12), and get a blacksmith to fashion four inches at one end into the form of a cone. Two inches from the point of the cone drill a one-half inch hole at *c* through one side of the pipe, and four inches above this a second hole the same size. Screw into the upper end of this a three-quarter inch gas pipe (*g*) twenty inches long. On the side of this get a tinner to strap a gallon tin can (*b*) with a tight screw cover. Connect the can from the bottom by use of a tin tube with the upper pole made through the larger piece of gas pipe. Inside the larger gas pipe fit a piston (*A*) with a rod (*D*) which shall reach through the smaller gas pipe and have a convenient ring at the end of this rod to grasp with the hand. When the piston is pushed down it shuts the opening from the gallon can, so that any liquid in the latter can not pass out. If the piston is raised the liquid at once runs into the hollow cone, when by pushing down the piston it is forced out the hole at *c*, and at the same time the opening is again closed. By use of a T joint a foot rest can be attached to the side of the larger piece of gas pipe (*G*) which may be useful in pushing the point into the ground, and holding the instrument down as we raise the piston. Of course earth will fill the hole in the conical point, but as the piston is forced down this will be crowded out.

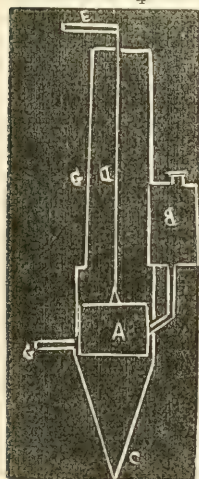


Fig. 12.

This will be used much as we manipulate the common hand corn-planter, and by its use kerosene can easily and quickly be made to kill such insects as root lice, cabbage and radish maggots, strawberry crown borers and girdlers, etc. I think by having the instrument made with care it may be economically used to apply bisulphide of carbon in like cases.

THE CURRANT BORER.

Ægeria tipuliformis, Linn. Family *Ægereidæ*. Order *Lepidoptera*.

This imported *Ægerian* or currant borer is becoming very common and destructive in Michigan. Like all of this *Lepidopterous* family of borers, this moth is a quick-winged, beautiful, wasp-like insect. It is thirteen mm. (3-16 of an inch) long, and expands 18 mm. (11-16 of an inch). The wings are transparent, with an opaque brown border, which is narrow on the posterior wings but quite wide on the tip of the primaries. Within this brown tip is a transparent cross line nearly as wide as the brown tip, and still nearer the base is a second brown cross line, less than half as wide as the other. The body, antennæ, and parts of the legs, are blue black, while the mouth parts, collar, four cross-bands on the abdomen, and portions of the legs, are golden yellow. Like all *Ægerians*, its abdomen is tipped with a brush. The larva is white, with brown head and legs. The chrysalis is brown, rather slim, and is always found in the hollow stem. Each segment is armed posteriorly with teeth.

HABITS.

The moth appears early in June, flying in the hot sunshine. The eggs are laid near a bud. The larva as soon as hatched bores or eats its way to the center of the stem and eats till the next May, tunneling the stem for some inches. Late in May and early in June the larvæ and pupæ will both be found in the hollow stems of the currant. Before pupating, the larva eats a hole through the stem to serve as a door of egress for the prospective moth state. Before the moth issues, the chrysalis wriggles its way out through the small hole cut by the larva, which it is enabled to do the more readily because of the saw-teeth like projections on the segments. As the moth flies forth, she leaves the pupa skin or case still sticking in the hole through which the pupa passed from the hollow in the stem.

REMEDIES.

From this borer we have bred several specimens of an *Ichneumon* parasite, which Mr. E. T. Cresson informs me are the *Phæogenes ater* Cress., the male of which he says is undescribed. I think this is the first mention of this parasite on the currant borer.

The female of *P. ater* Cresson, is described in Proceedings of American Entomological Society, vol. 3d, p. 138, as follows: Black; antenna with a white annulus; wings subhyaline; central area of metathorax large, subquadrate.

Female—Black, subopaque; head with white-pointed orbits, not reaching the clypeus, which is shining, and having a rather deep rounded fovea on each side; antennæ short, flattened towards the tip and slightly involute, the 8th and 14th joints white. Thorax finely punctured, subopaque; a minute white spot on each side in front of the tegulæ; scutellum flat, triangular, polished, distinctly punctured; metathorax finely scabrous, the elevated lines tolerably well defined and shining, the central area large subquadrate, rather smooth. Wings subhyaline, faintly tinged with fuliginous; nervures blackish, stigma piceous; areolet five angular, almost triangular. Legs black, the anterior tibiæ in front pale. Abdomen elongate, subopaque, very finely and densely punctured; first segment rather broad, bi-lineated, and finely aciculate, basal

foveæ of the second segment deep, transverse, and somewhat oblique; apical segments smoother, and shining; ovipositor not exerted. Length 7 lines, expanse of wings 11 lines. Habitat, New York and Illinois.

I find the antennæ in the males are without the white rings. They are brown or black, and taper towards the tip. The punctures are more thickly set in the male. The areolet is distinctly 5-angular. The front tibiæ and all the tarsi are pale. A brown or reddish ring marks the base of each femur, which is very distinct on the posterior legs. With these exceptions the male is much like the female as described by Mr. Cresson. The sex organs are of course different.

The best way to destroy this pest and to save our currant bushes, is to practice judicious pruning early in the spring. All stalks attacked by borers will show by their dead tips or diseased appearance that they are suffering from attack. These should all be cut off and burned. Such pruning will insure better fruit and healthier finer bushes even were there no borers; and unless such thinning is practiced our currant bushes will soon be utterly ruined. In future currants in our northern states mean fight. Since the advent of the saw fly, also imported, defoliation can only be stayed by a liberal use of pyrethrum or white hellebore. Such defoliation two successive seasons kills the bushes. Added to this, in all sections where the borer works, we must prune and burn each spring, then we may still eat our jelly tarts and our jelly cake.

A COMMON BUTTERFLY AN ENEMY.

Pyrameis cardui Linn, is one of our most common and most beautiful butterflies. It is a cosmopolite, being one of the very few species that is found in all countries. From its rare beauty it is not inappropriately called "The Painted Lady." The larvæ or caterpillars vary very much in coloration, and are decked with formidable branching spines. The caterpillar spins a web on the leaf by aid of which it draws the leaf over so as to cover itself with a shade tent. The chrysalis is adorned with golden or copper colored tubercles. Heretofore this caterpillar has only been noticed, in Michigan, to feed on thistles, and so was doubly welcome, not less from its beauty than from its feeding upon one of our most noxious plants. Dr. Harris in his admirable work says: "These caterpillars feed on thistles, particularly the spear thistle (*Cnicus lanceolatus*), on the leaves of the sunflower, hollyhock, burdock, and other rough leaved plants in June and July." (Harris's Injurious Insects, p. 293). Prof. S. H. Scudder states that "they feed on all thistles, *Helianthus*, mallows,"—these include hollyhock, "*Lappa major*" (burdock), "*Althæa rosea*" (marsh mallow), and "*Lilybum moreanum* or milk thistle."

This summer this insect has been a serious annoyance at Bay City, Michigan, as a destroyer of the hollyhock and hardy *Centaurea C. candidissima*. It is not strange that this insect should attack the *Centaurea*, as it is a composite plant closely related to the thistle and burdock, and, like most of the plants attacked by "The Painted Lady," has thick leaves.

At the college this insect has attacked the hollyhocks and one of our favorite bee plants the borage *Borrago officinalis*. I can find no mention of this insect on borage or any plant of that family.

REMEDY.

Mr. F. W. Grinnell, of Bay City, used the soap and kerosene mixture on

these insects with decided success. He found, however, that it was necessary to dash it unto them with force, a point which I have frequently urged in advising the use of any liquid preparations used to destroy injurious insects.

As yet we have reared no parasites from these caterpillars, though some of the chrysalids have turned black, which leads us to hope for the appearance of one or more of these welcome friends.

STRAWBERRY LEAF ROLLER.

Phoxopterus comptana, Fröl. Family *Tortricidae*. Order *Lepidoptera*.

This insect which I briefly described with illustrations in the State Pomological Report for 1873 p. 104, and which was again noticed with a brief description and remedies by C. M. Weed in the report of same society for 1883, p. 82, has become a very serious pest to the strawberry grower in several parts of our State. In several counties, especially in Jackson, it has done great damage the present year (1884). Two years ago I reared the moth from specimens received from Kalamazoo County. This year from specimens received from Jackson County.

The small reddish brown moths are only about 10 mm. long. They lay their eggs in May and July. The brownish or greenish brown larva feed in June and July and again in August and September. Thus there are two broods. The larva spins a web on the upper surface of the leaf by which the latter is rolled about the insect. It then feeds upon the leaf, causing it to turn gray or brown. One man in Michigan Centre, Jackson County, has had his plantation of six acres seriously injured by these consumers.

Prof. S. A. Forbes in his excellent report on strawberry insects states that in Iowa this insect also attacks the raspberry.

There is an Ichneumon fly that is very abundant in Michigan, which preys upon this leaf roller. I think it is undescribed. It certainly is not referred to as a destroyer of the leaf roller. I have not access to Cresson's description of the Genus *Eiphosoma*, but from the very short description and figure given by Packard, this species would seem to belong to that genus.

This species is black, with legs, ventral surface of abdomen, ring about the eyes, and base of the wings yellow. The antennæ are 4 mm. long, the wings about 3 mm. The ovipositor is black and about as long as the wings. The thorax and abdomen are finely punctured.

The fact that in some localities where this leaf-roller was very destructive two years ago it has been considerably less so since is significant as to the benefit which this parasite may do.

ARTIFICIAL REMEDIES.

Walsh & Riley recommended years ago the cutting of the vines as soon as the fruit season was over, late in June or the first of July, and burning them as soon as they are dry enough. Adding straw, or if there is dry mulch firing that will make the destruction more complete. This has been tried frequently with the most perfect success. Straw has been piled upon the vines as much as a foot high and burned without doing any injury to the plantation. Where the beds are extensive the cutting may be done with a mower. Prof. Forbes gives cases where chickens have rid the plants of these leaf rollers. In case of a small plantation this remedy may be all-sufficient.

THE FOOD RELATIONS OF BIRDS, FROGS, AND TOADS.

THESIS FOR THE DEGREE OF MASTER OF SCIENCE.

BY CLARENCE M. WEED.

I. THE FOOD OF YOUNG BIRDS.

Probably few subjects have been so much discussed with so little basis of known facts as the ever important one of birds and their relations to agriculture. Aside from a few occasional superficial examinations of the contents of birds' stomachs but little has been done in investigating the food of adult birds until the subject was attacked with the energy and scientific accuracy characteristic of the present State Entomologist of Illinois, Professor S. A. Forbes.

The literature of the food of young birds is still more scanty. About the only reference to the subject is that of Prof. Treadwell's earthworm-eating young robin, which is as Prof. Forbes has said, "a bird whose fame has extended over both hemispheres."

It was with a view of adding something more tangible to our knowledge of the subject than the poetic sentiment which is so often thrown as a mantle of charity over the actions of our feathered friends, that the investigations of which this paper gives the preliminary results were undertaken.

The method has been the same as that employed by Prof. Forbes in his recent investigations of the food of the adult birds, namely an actual examination and determination of the contents of the young birds' stomachs. This is the only accurate and scientific method of grappling with the problem, and to it is due whatever value the results attained may possess. Some idea of the difficulty and magnitude of the task may be given by stating that a half day was frequently spent in the examination of the contents of a single stomach. After removing all recognizable insects and carefully estimating the percentage of each to the whole of the food, a large proportion still remained to be picked over, under the microscope, with a pair of needle points, the recognizable particles separated, the insects of which they were a part reconstructed in the mind's eye, and the percentage estimated. Even after this a small portion usually remained undetermined. The contents of each stomach were then bottled and placed away for future reference and verification.

I here desire to express my thanks to Prof. A. J. Cook, to whose patience and knowledge I have been an hourly debtor; to Dr. W. J. Beal for the identification of vegetable particles, and to Master Bertie Cook for many specimens kindly procured. The published investigations of Prof. S. A. Forbes have also been of great value, being, as they are, monuments of scholarly and painstaking industry of which any man might well be proud. From them I have obtained the forms for the tables which follow.

MIMUS CAROLINENSIS.—Cat bird.

Date of capture.....	May.		June.		Average Percentage.
	30	2	2		
KINDS OF FOOD.	Percentage of each Element of Food,				
I. INSECTS.....	.87	.99	100		.95
Undetermined.....	.12	.06	.07		.08
1. <i>Lepidoptera</i>.....	.58	.63	.66		.62
Noctuidæ.....	.58	.63	.66		.62
Larvæ.....	.54	.63	.66		.62
Imagos.....	.04	---	---		.01
2. <i>Coleoptera</i>	---	.15	.25		.13
Undetermined.....	---	.04	.01		.01
Carabidæ.....	---	.09	.24		.11
Buprestidæ.....	---	.01	---		---
Curculionidæ.....	---	.01	---		---
3. <i>Orthoptera</i>.....	.11	---	.02		.04
Acrididæ.....	.11	---	.02		.04
4. <i>Neuroptera</i>.....	.06	.15	---		.07
Undetermined.....	---	.05	---		.01
Ephemeridæ.....	.06	.04	---		.03
Libellulidæ.....	---	.06	---		.02
II. ARACHNIDA.....	.05	---	---		.02
III. MYRIOPODA.....	.08	---	---		.03
IV. VEGETATION.....	---	.01	---		---

ECONOMIC RELATIONS.

It is thus seen that cut-worms and other injurious larvæ form by far the largest proportion of the young cat-bird's food; that the equally injurious moths are eaten to a certain extent, as is also true of grasshoppers; that injurious beetles form a small proportion of the food, as do the *Ephemera* or May flies.

But these results also show that insects which in the present state of economic entomology are considered beneficial are eaten. The *Libellulidæ* or dragon flies formed a small proportion of the food of the second bird. Before recording this fact against the birds, however, justice demands a more thorough knowledge of the food habits of the *Neuroptera* than we at present possess. Possibly the dragon flies are not as beneficial as they have sometimes been thought to be. Probably their food consists of two winged flies which are as likely to be beneficial as injurious, as is also true of the four winged *Hymenopterous* insects which they probably also devour. The same doubt exists as to the spiders found in some of the stomachs examined. May it not be probable that the benefits of spiders have been overestimated?

With the *Carabid* beetles we can, thanks to Prof. Forbes's recent investigations, be more certain of what we assert. Prof. Forbes has found that the beetles of this family, which are most largely eaten by adult birds, are very largely vegetable feeders. If this is true of the adult birds, there is every reason to believe that it is equally true of the nestlings.

THE ROBIN—(*Turdus migratorius*).

Probably the economic status of this species has been more generally discussed than that of any other bird. Many horticulturists believe that the species is more injurious than beneficial; that the berries and cherries eaten are far from compensated for by the insects devoured. It has been very generally thought that earthworms form by far the largest proportion of the food of the young.

The stomach of one adult robin, which was the only fully developed specimen which I examined, contained so striking an instance of the beneficial influence of the bird, that I notice it here, although not coming properly under the subject of the food of young birds. The stomach was almost wholly filled with the injurious larvæ of the family *Anthomyiidae*. This is the family to which belong the notorious cabbage and radish flies, which in many places have stopped cabbage production, with a consequent loss of thousands of dollars annually. By actual count there were *sixty* of these anthomyian larvæ in the single stomach.

The bird was shot between a row of cherry trees and a raspberry patch, both in bearing, and but a few rods apart. Yet many a horticulturist asserts that in the berry and cherry seasons the robin eats no insect food.

TURDUS MIGRATORIUS.—Robin.

Date of capture.....	May.						Average Percent- age.
	13	15	16	21	22	30	
KIND OF FOOD.	Percentage of each Element of Food.						
I. MOLLUSCA.....	.01	.04	---	.01	.05	---	.01
Univalve.....	.01	.04	---	.01	.05	---	.01
II. INSECTS.....	.05	.46	.70	.14	.60	.52	.41
Undetermined.....	.02	.20	.09	.04	.04	.05	.07
1. <i>Lepidoptera</i> (Larvæ).....	.02	.26	.49	---	.50	.35	.27
Undetermined.....	.02	.08	---	---	---	.35	.07
Noctuidæ.....	---	.10	.49	---	.50	---	.18
Phalaenidæ.....	---	.08	---	---	---	---	.01
2. <i>Coleoptera</i>.....	.01	---	.12	.10	.06	.12	.07
Undetermined.....	---	---	---	.04	.06	---	.02
Carabidæ.....	.01	---	---	.06	---	.04	.02
Aphodiidæ.....	---	---	.12	---	---	---	.02
Aphodius serval.....	---	---	.06	---	---	---	.01
Aphodius granarius.....	---	---	.06	---	---	---	.01
Curculionidæ.....	---	---	---	---	---	.08	.01
III. MYRIOPODA.....	---	---	.10	.20	---	---	.05
Undetermined.....	---	---	.10	.10	---	---	.03
IV. VERMES.....	---	.30	---	.50	---	.42	.20
Lumbricus.....	---	.30	---	.50	---	.42	.20
V. VEGETATION (grass, etc.).....	.94	.20	.20	.25	.35	.36	.33

These results show that the young robin eats many more injurious Lepidopterous larvæ and fewer earth worms than has generally been supposed; that grass blades are almost always present, although probably introduced largely by accident with the other elements of the food; that the predaceous beetles

of the family *Carabidae* are eaten to a certain slight extent. For the latter the hints given by Prof. Forbes's investigations, mentioned in considering the cat-bird, are applicable.

SIALIA SIALIS.—*Blue bird.*

Date of capture.....	June.		Average Percentage.
	1	2	
KINDS OF FOOD.	Percentage of each Element of Food.		
I. MOLLUSCA.....		.02	.01
Univalve.....		.02	.01
II. INSECTS.....	.99	.66	.87
Undetermined.....	.36	.06	.21
1. <i>Lepidoptera</i>.....	.55	.60	.57
Undetermined.....	.55		.27
Noctuidæ.....		.60	.30
2. <i>Neuroptera</i>.....	.08		.04
Libellulidæ.....	.08		.04
III. ARACHNIDA.....		.32	.16
1. <i>Araneida</i>.....		.32	.16
Imagos.....		.28	.14
Eggs.....		.04	.02
IV. VEGETATION.....	.01		

ECONOMIC RELATIONS.

Here again we see the importance of a knowledge of the food habits of dragon flies and spiders; if it is true that spiders are wholly beneficial, candor compels the conclusion that the second bird did more harm in destroying the 32% of spiders than it did good in giving the *coup de grace* to the 60% of cut-worms, for by destroying a cut-worm it but ends "an elemental life," while in destroying a spider it gives life, liberty, and the pursuit of food to a great many injurious insects which the latter would have destroyed had he not met his untimely fate. But this is more than any one has a right to assume while our profound ignorance of the food habits of the ground spiders continue to exist.

QUISCALUS PURPUREUS.—*Crow Blackbird.*

Date of capture.....	May.			Average Percentage.
	22	22	26	
KINDS OF FOOD.	Percentage of each Element of Food.			
I. MOLLUSCA.....	.02	---	---	.01
Univalve.....	.02	---	---	.01
II. INSECTA.....	.98	.98	.72	.89
Undetermined.....	.34	.60	.07	.33
Larvæ.....	.28	.44	---	.24
Pupæ.....	---	.10	---	.03
Imago.....	.06	.06	---	.04
1. <i>Lepidoptera</i> (Larvæ).....	.19	.10	.11	.13
Undetermined.....	.19	---	.11	.10
Noctuidæ.....	---	.10	---	.03
2. <i>Diptera</i>.....	.01	---	---	---
Cecidomyiadae (<i>Puparia</i>).....	.01	---	---	---
3. <i>Coleoptera</i>.....	.42	.18	.02	.21
Undetermined.....	.37	.14	.01	.17
Larvæ.....	.32	.10	---	.14
Imagos.....	.05	.04	---	.03
Scarabeidæ.....	---	---	.01	---
Elateridæ.....	.05	.04	---	.03
4. <i>Hemiptera</i>.....	.02	.06	.39	.15
Nepidæ.....	.02	.06	.39	.15
Belostoma (Eggs).....	.02	.06	.39	.15
5. <i>Neuroptera</i>	---	.04	.24	.09
Undetermined.....	---	.04	---	.01
Libellulidæ.....	---	---	.24	.08
III. CRUSTACEA.....	---	---	.27	.09
Cray-fish.....	---	---	.27	.09
IV. VEGETATION.....	---	.02	.02	.01

ECONOMIC RELATIONS.

Here again we see the necessity of a knowledge of food habits of dragon flies, as also of the crayfish. The eggs of *Hemiptera* found so numerously were in all probability those of *Belostoma Americanum*, a large brownish bug inhabiting our fresh water lakes, rivers, and ponds; this insect is injurious because of its habit of killing small fish by transfixing them on its spear-like beak. The grass found was probably accidentally introduced. Taken as a whole, the good done by young blackbirds, as indicated by the specimens examined, far overbalances the slight injury probably due to the destruction of beneficial insects.

SUFFICIENCY OF DATA.

No one is better aware of the insufficiency of the data here given for any very general conclusions than myself. The difficulty of obtaining specimens, the time required for each examination as well as the pressure of other duties have rendered the examination of a greater number of specimens and species impossible. The subject has been so little investigated in the past that the

pioneer work has been attended with more difficulty than if it had been an old and well beaten field. It may well be doubted also whether it would be best to investigate the whole subject in a single season; by continuing the investigation through a series of years, even though but few specimens were examined each year many accidental errors would be eliminated and a much broader basis for generalization obtained.

But although the data here given may not be sufficient to justify any very general conclusions they at least point to such. Before we have a right to say that any bird must go, careful investigations must be made, through a long series of years, of its food, not only under the normal conditions of insect and plant life, but also under the many abnormal conditions that annually arise. Not only must this be done in one locality but also in several localities, for a bird may during its sojourn in one place where exceptional conditions exist do great injury, while in another place where the conditions of life are different it may do only good and *vice versa*. So many points arise in grappling with Nature's problems that the greatest care is required before any safe conclusion can be arrived at; and before the question of the relations of birds to agriculture can be intelligently discussed, a more general knowledge must be obtained not only of the food of birds, at all ages and under all conditions, but also of the relations of the different classes of insects to each other and to agriculture.

II. THE FOOD OF FROGS.

The investigations which are here recorded were undertaken to determine the economic status of two of our common frogs, namely: the spotted frog, *Rana halecina*, and the green frog, *Rana clamitans*. On account of the abundance and general distribution of these two species, they must exert a very appreciable influence upon the agricultural interests of our country. So far as can be learned but very little has hitherto been known of the food of either of these species.

RANA HALECINA.—*Spotted Frog.*

Date of capture.....	July.								Average Percent- age.
	12	14	14	16	15	16	17	17	
KINDS OF FOOD.	Percentage of each Element of Food.								
I. INSECTA.....	.95	.64	.82	.96	.98	.54	.78	.82	.80
Undetermined.....	.06	.04	.04	.04	.01	.02	.04	.02	.04
1. <i>Hymenoptera</i>	---	---	.03	---	---	---	---	---	---
Formicidæ.....	---	---	.03	---	---	---	---	---	---
2. <i>Lepidoptera</i>	---	---	.39	---	---	.36	.40	---	.14
Undetermined.....	---	---	.39	---	---	.36	---	---	.09
Noctuidæ.....	---	---	---	---	---	---	.40	---	.05
Imago.....	---	---	---	---	---	---	.38	---	---
Eggs.....	---	---	---	---	---	---	.02	---	---
3. <i>Diptera</i>	---	---	---	---	---	---	.04	---	---
Undetermined.....	---	---	---	---	---	---	.04	---	---
4. <i>Coleoptera</i>.....	.03	.26	.31	.92	.97	.06	---	.38	.36
Undetermined.....	---	---	---	---	---	.06	---	.14	.02
Carabidæ.....	.03	.23	.31	.74	.39	---	---	.22	.24
Undetermined.....	.03	.12	.16	---	---	---	---	---	.04
Pterostichus lucublandus.....	---	.11	.15	---	.39	---	---	.22	.10
Anisodactylus.....	---	---	---	.36	---	---	---	---	.04
Anisodactylus Baltimorensis.....	---	---	---	.38	---	---	---	---	.05
Staphylinidæ.....	---	---	---	---	.58	---	---	---	.07
Otiiorhynchidæ.....	---	.03	---	.18	---	---	---	---	.03
Otiiorhynchus ligneus.....	---	.03	---	.18	---	---	---	---	.03
5. <i>Hemiptera</i>.....	.10	---	.05	---	---	---	---	---	.02
Undetermined.....	.02	---	---	---	---	---	---	---	---
Corisiæ.....	.08	---	.05	---	---	---	---	---	.02
6. <i>Orthoptera</i>.....	.76	.38	---	---	---	.14	.30	.42	.25
Acrididæ.....	.76	.38	---	---	---	.14	.30	.42	.25
II. ARACHNIDA.....	.01	---	---	---	---	.42	---	---	.05
1. <i>Araneina</i>	---	---	---	---	---	.42	---	---	.05
2. <i>Acarina</i>.....	.01	---	---	---	---	---	---	---	---
III. MYRIOPODA.....	---	.08	---	---	---	---	---	---	.01
Undetermined.....	---	.08	---	---	---	---	---	---	.01
IV. VEGETATION.....	.04	.24	.18	.04	.02	.02	.22	.18	.10

ECONOMIC STATUS.

Viewing these results from an economic standpoint, we observe that of the 87 per cent of insects and spiders which are eaten in July by the spotted frog, at least 52 per cent are injurious, that about 26 per cent are of a doubtful nature, and that about nine per cent, consisting of the undetermined carabid beetles and spiders, are probably beneficial. But even this small percentage is probably unfair to the frogs, as it gives all the undetermined *Carabidæ* the credit of being beneficial. When we consider that all of these beetles which could be determined were either of very slight benefit or none at all we may well doubt whether the undetermined ones were any more beneficial. In the present state of economic entomology we must class the spiders as beneficial, although to what extent they are so is uncertain. The ten per cent of vegetable matter consisting of dry grass, small pieces of wood, etcetera, accidentally introduced, can not be considered as against the frog.

These facts show that the thousands of frogs which inhabit our marshes and meadows are of immense value in checking the increase of noxious insects, especially of those which, like the cutworms and grasshoppers, feed upon grass and similar crops. Who can foretell the result if in the case of the grasshoppers alone the great and constant pressure which is thus brought to bear upon them were removed? Dr. Beal suggests that the absence of marshes and ponds, and consequent scarcity of frogs in the west, may be one of the reasons why grasshoppers are there so numerous.

RANA CLAMITANS.—*Green Frog.*

Date of capture.....	July.				Average Percentage.
	14	14	22	22	
KINDS OF FOOD.	Percentage of each Element of Food.				
I. MOLLUSCA.....	.24	—	—	—	.06
Univalve.....	.24	—	—	—	.06
II. INSECTS.....	.67	.78	.96	100	.85
Undetermined.....	.01	.30	.08	.02	.10
1. <i>Hymenoptera</i>.....	.21	—	—	.90	.28
Undetermined.....	—	—	—	.34	.08
Apidae (<i>Apis mellifica Drone</i>).....	—	—	—	.66	.16
Formicidae.....	.21	—	—	—	.05
2. <i>Lepidoptera (Larvae)</i>.....	.28	—	—	—	.07
Undetermined.....	.28	—	—	—	.07
3. <i>Coleoptera</i>.....	.17	.48	.88	.08	.40
Undetermined.....	—	.09	.08	—	.04
Carabidae.....	—	—	—	.08	.02
Undetermined.....	—	—	—	.08	.02
Dytiscidae.....	—	—	.46	—	.11
Undetermined.....	—	—	.46	—	.11
Otiiorhynchidae.....	.17	.39	—	—	.14
Otiiorhynchus ligneus.....	.17	.39	—	—	.14
Coccinellidae.....	—	—	.34	—	.08
Megilla maculata.....	—	—	.34	—	.08
III. VEGETATION (grass, sticks, etc.).....	.09	.22	.04	—	.09

ECONOMIC RELATIONS.

The coccinellid beetle found in the third specimen was the only instance in which I have found a member of this useful family of beetles in an animal's stomach. It is a noteworthy fact, however, that the specimen belonged to a species (*Megilla maculata*) which last year did much damage to corn in some portions of the country.

These results show that the food of this species does not differ essentially from that of the *R. halerina*, and that what was said of the latter is almost equally true of this.

III. THE FOOD OF TOADS.

Few animals have been blessed with greater notice in the volumes of superstitious lore than the wart toad. From time immemorial it has been associated the mind with witchcraft, sorcery, and superstition. Over and over again the virtues of the jewel in its head been sung. Possibly that jewel may have been its appetite for noxious insects.

The utility of the toad as an insect destroyer has long been recognized. Our agricultural literature is full of references to the subject. Yet I know not that any accurate scientific investigation of the food of the species has been made. It is true that many times the contents of their stomachs have been examined, but I can find no reference to any instances in which an attempt has been made to discover whether the insects found therein were beneficial or injurious to agriculture. Hence I have thought an accurate, scientific examination even of a very few specimens would be of value in testing the popular belief that these animals are of real benefit to the agriculturist.

BUFO LENTIGINOSUS.—*Toad*.

Date of capture.....	July.							Average Percent- age.
	14	12	23	22	24	24	24	
KINDS OF FOOD.	Percentage of each Element of Food.							
I. MULLUSCA.....	---	---	---	---	.09	.02	---	.01
Univalve.....	---	---	---	---	.09	.02	---	.01
II. INSECTS.....	.44	.95	.89	.93	.91	.96	.94	.81
Undetermined.....	.06	---	.12	.09	.16	.02	.04	.06
1. <i>Hymenoptera</i>.....	.34	.19	.24	---	.18	---	.78	.24
Undetermined.....	---	---	.05	---	---	---	---	.01
Formicidæ.....	.34	.19	.19	---	.18	---	.78	.23
2. <i>Lepidoptera</i>	---	.34	---	.23	---	.34	---	.14
Undetermined (Larvæ).....	---	.18	---	.23	---	---	---	.04
Noctuidæ.....	---	.16	---	---	---	.34	---	.10
3. <i>Diptera</i>	---	---	.02	.04	---	---	---	.01
Undetermined.....	---	---	.02	.04	---	---	---	.01
4. <i>Coleoptera</i>.....	.04	.37	.42	.33	.27	.40	---	.26
Undetermined.....	.04	---	.05	.03	.13	---	---	.03
Carabidæ.....	---	.26	.29	.05	---	.40	---	.14
Undetermined.....	---	---	.29	.05	---	.09	---	.07
Harpalus.....	---	.08	---	---	---	.31	---	.05
Amara obesa.....	---	.97	---	---	---	---	---	.01
Calathus gregarius.....	---	.05	---	---	---	---	---	---
Pterostichus lucublandus.....	---	.06	---	---	---	---	---	.01
Tenebrionidæ.....	---	.04	---	---	---	---	---	---
Elateridæ.....	---	.06	.04	---	---	---	---	.01
Rhyncophora.....	---	.01	.04	.25	.14	.09	---	.07
Undetermined.....	---	---	.04	---	---	---	---	---
Otiiorhynchidæ.....	---	.01	---	.25	.14	.09	---	.07
Otiiorhynchus ligneus.....	---	.01	---	.25	.14	.09	---	.07
5. <i>Hemiptera</i> (<i>Heteroptera</i>).....	---	.03	.09	---	---	---	---	.02
Undetermined.....	---	.03	.09	---	---	---	---	.02
6. <i>Orthoptera</i>	---	---	---	.24	---	.11	.12	.06
Gryllidæ.....	---	---	---	.21	---	.11	---	.04
Acrididæ.....	---	---	---	.03	---	---	.12	.02
Coloptenus femur-rubrum.....	---	---	---	.03	---	---	.12	.02
III. ARACHNIDA.....	.08	---	---	---	.20	---	---	.04
1. <i>Araneina</i>	---	---	---	---	.16	---	---	.02
2. <i>Acarina</i>.....	.08	---	---	---	.04	---	---	.02
IV. MYRIOPODA.....	.48	---	.05	---	---	---	---	.07
Undetermined.....	.48	---	.05	---	---	---	---	.07
V. VEGETATION (dry grass, etc.).....	---	.05	.06	.07	.10	.02	.06	.05

ECONOMIC RELATIONS.

Thus we see that ants form the largest percentage of any element in the adult toad's food; that the beetles of the family *Carabidæ* and injurious lepidopterous insects are next most largely eaten, and that grasshoppers and crickets, as also the beetles of the strawberry crown girdler (*O. ligneus*), come next in order.

The ants cannot be classed as beneficial because when very numerous they become a nuisance. The Carabid beetles almost without exception belonged to the genera which Prof. Forbes has found to be vegetable feeding, so that their destruction cannot be deplored. The other elements were almost wholly injurious.

The food of the small toads, so far as could be determined from a number of specimens examined, consists of injurious or innoxious species.

Thus we see that the value of toads has not been overestimated in the popular mind. They are of immense benefit, and should be allowed life, liberty, and the pursuit of happiness at all times. About the only thing that is said against them is that they sometimes eat honey-bees when near the hives. This can be easily obviated by placing boards a few inches high around the apiary.

THE CHERRY SLUG.

BY CLARENCE M. WEED.

Selandria cerasi, Peck. Order, *Hymenoptera*. Family, *Tenthredinidæ*.

This is another of the pests which are unusually abundant the present season; from all over the State complaints have come of its destructive ravages. This insect is no new enemy to American pomologists; nearly a century ago it was described by Prof. Peck of Massachusetts, and later was fully treated of in Dr. Harris's classic work on "Insects Injurious to Vegetation." But little has been written about it since, although Prof. Forbes treats of it in his report as State Entomologist of Illinois for 1882, stating that it is quite destructive to cherry trees throughout the northern part of that State.

NATURAL HISTORY.

The four winged flies, known to science as *Selandria cerasi*, are closely related to the notorious currant worm, both belonging to the *Tenthredinidæ* or saw-fly family. To this family also belong several other injurious species; among them are the rose slug, the raspberry slug, the strawberry slug, and a species which often does much injury to oaks by devouring their foliage. The insects of this family are so named because of the saw-like ovipositors with which they make incisions in the leaves to receive their eggs.



Fig. 13.

The cherry saw-fly (Fig. 13) is a blackish insect about one fifth of an inch long. The eggs for the first brood of worms are laid early in June; these soon hatch into olive green, slimy slugs (Fig. 14), having twenty short legs. The name of slug is a misnomer, as the true slugs are not insects at all. These pests were probably so called because of their resemblance to the true slugs. They eat the upper surface of the leaf, causing a badly



Fig. 14.

eggs for a second brood. Besides the cherry this insect infests pear trees, and is said to sometimes attack the mountain ash.

REMEDIES.

There is a small parasite which kills a great many of the eggs. Among artificial remedies the one which has been recommended for many years past, is that of throwing road dust or ashes over infested trees; this sticking to the slimy coverings of the worms has been supposed to kill them. But some experiments made by the able editor of the *Canadian Entomologist*, Mr. Wm. Saunders, of London, Ont., quoted in the report of Prof. Forbes above referred to, throw much doubt upon the efficacy of this time-honored remedy. They are as follows:

"As soon as the slugs were observed at work in the spring, they were treated to a plentiful supply of dry sand, thrown up into the higher branches with a shovel and shaken over the lower ones with a sieve, which stuck thickly to their slimy skins, completely covering them up.

"Thinking we must have mastered them by so free a use of this long-trusted remedy, we took no further heed of them for some days, when, to our surprise, they were found as numerous as ever. The next step was to test this sand remedy accurately, to see what virtue there was in it. Several small branches of pear trees were selected and marked, on which there were six slugs, and these were well powdered over—entirely covered with dry sand; on examining them the next morning it was found that they had shed the sand-covered skin, and crawled out free and slimy again. The sand was applied a second and third time on the same insects, with similar results; and now, being convinced that this remedy was of little value, they were treated to a dose of hellebore and water, which soon finished them. Ashes were now tried on another lot, the same way sand had been, with very similar results."

Apropos of the above, some experiments I recently made upon the subject may be of interest. Eighteen leaves having slugs upon them were marked and the slugs thoroughly dusted with fresh wood ashes. Twenty-eight hours afterwards, eight had either wholly or partially shed the ash-covered skin, one was still covered but alive, and nine had disappeared. It is probable that the latter had left the leaves on which they were, to crawl to neighboring leaves. In order to test this, a number of leaves were marked which had slugs upon them, and the neighboring leaves searched to see that no slugs were upon them. Those on the marked leaves were now dusted with road dust, and when visited twenty-four hours later, nearly all which were missing from the marked leaves were found on neighboring leaves, which had none on them before; thus showing that the insects had found the dust-covered leaves distasteful, and had emigrated to greener pastures. That they were the slugs dusted was usually evidenced by an occasional particle of dust still adhering to them.

Pyrethrum was found to be very efficient in destroying these slugs, applied either in powder or solution. Experiments on individual slugs seemed to

indicate that the former was most effective. A badly infested tree was completely cleared of the pests by spraying with pyrethrum in water by means of a fountain pump. As stated by Mr. Saunders in the above quotation, hellebore is sure death to them. Either this substance or pyrethrum is preferable to the deadly arsenical compounds which doubtless would be equally efficacious in destroying them. The kerosene and soap mixture would, without doubt, also kill them.

REPORTS FROM COUNTY SOCIETIES.

WESTERN MICHIGAN AGRICULTURAL AND INDUSTRIAL SOCIETY.

The fourth annual meeting of the board of directors for the purpose of completing the business of the past year, was held at Sweet's hotel, Grand Rapids, January 16, 1883.

Geo. W. Thayer, president of the society, called the meeting to order, and thirteen directors answered to roll call.

President Thayer submitted the following address and report:

GENTLEMEN OF THE SOCIETY: As required by our articles of association and by-laws, we have assembled together to close up the business of the year 1882, and to make necessary preparation for the next, for fifth annual exhibition of our society.

The reports to be laid before you, covering the time from the date of the last annual meeting, indicate that the last fair of our organization adds one more to the record of successful exhibitions by the Western Michigan Agricultural and Industrial society.

The gross receipts into the treasury for the past year have been greater than in any former year in its history; yet the net earnings of the last exhibition fall below those of previous years, except that of 1880, when, in consequence of a reduction in general admission at the gates to 25 cents, the surplus of 1879 was reduced from \$2,974.85 to \$1,819.20. The expenditures on the buildings and grounds in repairs and improvements for 1882, exceed those of 1881 by \$334.93; the expenses of the fair of 1882 exceed those of 1881 by \$206.71; the premiums paid in 1882 are in excess of those of 1881 by \$1,880.75; making a total excess of expenditure in 1882 over 1881 of \$2,422.33; leaving to the society, as shown by the report of the treasurer, a surplus in the treasury at this date of \$4,705.96, or a net gain for the year of \$1,278.61.

The next fair of this society will be the last to be held under the present lease from the Kent county society. At the close of our last meeting a resolution was adopted that a committee of three be appointed for the purpose of investigating and reporting to this meeting what arrangements can be made, either by lease or purchase, for grounds suitable for the use of this society after the year 1883. Such committee was appointed, and it is expected they will submit a report for your consideration. The special premiums offered by the Grand Rapids & Indiana railroad company for 1882, brought out excellent exhibits of corn from some of the southern counties. The committee appointed to examine and report upon the fields of corn entered for such premiums, have submitted a full report in writing. I think it but justice to the company that this report should appear in our next premium list.

The society are under great obligations to the various railroad lines extending to this city; also to the Flint & Pere Marquette, the Detroit, Lansing & Northern, and the Chicago & Grand Trunk for reduced rates for passengers and freight, to and from our fair. Owing to a failure on the part of some official to instruct the various local agents of the Michigan Central branch between Jackson and this city, as to our duly authorized terms for passengers and freight to and from the exhibition many exhibits at the State fair were prevented from reaching us. This created some dissatisfaction, and to those who made shipments as well; but, upon a presentation of facts, the company refunded the freight exacted from shippers, and did what they could to correct the oversight.

I have no recommendations to make. The affairs of the society are in a satisfactory condition. It appears to be only necessary that the management renew the efforts heretofore made to advance the interests of the society, to secure a continuation of the satisfactory results attained.

The following is a summary of the report of the Treasurer, E. B. Dikeman :

RECEIPTS.

Balance of cash on hand at annual meeting 1882.....	\$3,427 35
Amount from sale of tickets.....	9,508 60
Membership tickets.....	364 00
Booth privileges.....	2,237 00
Speed entries.....	1,437 50
Herd entries.....	77 50
Subscription of fifty dollars (1879).....	50 00
Premiums forfeited of 1881.....	87 50
Amount donated by M. L. Sweet.....	50 00
By C. C. Comstock.....	5 00
Rent of building.....	18 00
Sale of refuse.....	10 00
Total receipts.....	\$17,272 45

DISBURSEMENTS.

Paid by business committee for general repairs.....	\$750 31
Paid in premiums.....	6,614 00
Expenses of the fair.....	4,500 58
Tickets furnished members.....	291 20
Interest paid on mortgage of Kent county society.....	410 40
Amount of cash on hand.....	4,705 96
	\$17,272 45

SECRETARY'S REPORT.

At the fourth annual fair of the W. M. A. & I. society three hundred and sixty-four annual membership certificates were issued.

To life members of Kent county agricultural society one hundred and twenty-nine special complimentary tickets were issued, forty-two of which were not called for.

The number of entries in Section A, Horses, was one hundred and seventy-nine, and in Speed department seventy. The amount paid for premiums in Section A., exclusive of speed was \$669.

Section B, Cattle, had two hundred and fourteen entries. Amount of premiums awarded \$797. Received from Herd entries \$77.50.

Section C, Swine, contained fifty-six entries, and \$143 was awarded in premiums.

Section D, Sheep, had two hundred and eighteen entries and \$268 awarded in premiums.

Section E, Poultry, two hundred fifty-eight entries; the amount of awards was \$281.

Section F, Farm Products, four hundred and five entries; \$302 awarded in premiums, not including special premiums.

Section G, Fruits and Flowers, contained nine hundred and twenty-two entries, and premiums to the amount of \$478.75 were awarded.

Section H, Farm Machinery, two hundred and twenty-six entries; amount of cash premiums \$35.

Power Machinery, had twenty-two entries.

Section K, Vehicles, seventy-four entries, cash premiums \$50.

Section M, Manufacturers, ninety-nine entries, cash premiums \$51.

Sections N and O, Arts and Science, contained 419 entries, amount of premiums Sec. N, \$203, and Sec. O, \$239.50.

Youth's Department contained 231 entries, and \$98.50 was awarded in premiums.

Making a total of 3,294 entries and amount of premiums not including speed \$3,627.25.

Seventy-two Diplomas were awarded.

After allowing some discretionary premiums and transacting other business the meeting adjourned sine die.

The annual meeting of the society for the election of five directors was held immediately after the close of the meeting of the board of directors, and the five directors whose term of office had expired were reelected without a dissenting vote.

The names of the five directors elected for three years are as follows: John H. Withey, Ada; William Ladner, Big Rapids; Anderson Stout, St. Johns; Westbrook Divine, Belding; J. G. Ramsdell, Traverse City.

After the election of directors the board proceeded to elect president, secretary, and treasurer, and the officers whose terms had expired were unanimously reelected.

President, Geo. W. Thayer, Grand Rapids; secretary, James Cox, Grand Rapids; treasurer, E. B. Dikeman, Grand Rapids.

At the evening meeting the president announced the following standing committees for the ensuing year:

- On business—Sherwood, Dikeman, and Ramsdell.
- On finance—Fralick, Fuller, and Strong.
- On premium list—Adams, Divine, Whitney, Fralick, and Sherwood.
- On rules and regulations—Ramsdell, Withey, and Whitney.
- On printing—Fuller and Adams.
- On programme—Whitney, Ladner, and Withey.
- On pedigree of cattle—Divine, Woodman, and Ryerson.
- On pedigree of horses—Stout, Russell, Dikeman, and Kelsey.
- On pedigree of sheep—Withey, Ladner, and Stout.

The president further named H. C. Sherwood of Watervliet as general superintendent, and the following section superintendents.

- Of section A (horses)—A. Stout, St. Johns, and A. F. Kelsey, Orleans.
- Of section B (cattle)—Westbrook Divine, Belding, and A. Ryerson, Hastings.
- Of sections C and D (sheep and swine)—F. J. Russell, Hart.
- Of section E (poultry)—John H. Withey, Ada.
- Of section F (agricultural products)—Wm. Ladner, Big Rapids, and David Woodman, Paw Paw.
- Of section G (fruit and flowers)—H. Dale Adams, Galesburg.
- Of section H (farm machinery)—E. A. Strong, Vicksburg.
- Of section K (vehicles)—H. C. Sherwood, Watervliet.
- Of section L (machinery)—E. A. Strong, Vicksburg.
- Of section M (manufactures)—C. L. Whitney, Cincinnati.
- Of section N and O (art and science)—J. G. Ramsdell, Traverse City.
- Of police and gates—Henry Fralick, Grand Rapids.
- Of forage—S. L. Fuller, Grand Rapids.

After the appointment of these the meeting adjourned, and the various committees went into session to discuss the premiums for the next meeting of the association, and continued for several hours.

It was decided to hold the next fair of the society, commencing Sept. 24, 1883, and continuing five days.

JAMES COX,
Secretary.

Grand Rapids, January 19, 1883.

ALPENA COUNTY AGRICULTURAL SOCIETY.

Report of the Sixth Annual fair of Alpena County Agricultural Society, held at Alpena, October 11th and 12th, 1883.

Total receipts, including county appropriations.....	\$853 69
<i>Disbursements.</i>	
For premiums per annexed schedule.....	\$217 00
All other incidental expenses.....	232 04
	<hr/> 449 04
Balance, excess of receipts above disbursements.....	\$404 65
Against which balance there is to be paid the annual interest on the bonded debt of the association, \$250 00.	

CLASSIFICATION OF PREMIUMS AWARDED.

Department "A"—Stock.

Class 1—Horses.....	\$32 50
" 2—Cattle.....	42 00
" 5—Coarse wool sheep.....	19 50
" 6—Hogs.....	3 00
" 7—Poultry.....	8 00

Department "B"—Grain.

Class 1—Grain.....	\$27 50
" 2—Roots and Garden Produce.....	29 00
" 3—Fruits.....	8 00

Department "C"—Flowers.

Class 1—Flowers.....	\$5 00
" 2—Ornamental and artistic.....	10 50
" 3—Domestic and mechanical.....	5 00

Department "D"—Domestic.

Class 1—Dairy and household.....	\$11 00
" 2—Domestic manufactures.....	16 00
	<hr/> \$217 00

All of which is respectfully submitted.

N. M. BRACKENREED,
Secretary.

AVON AGRICULTURAL SOCIETY.

As our society has not been represented in the reports of the secretary of the State Agricultural Society heretofore, we deem it best to give a short synopsis of this society's organization and progress up to the present time, as follows:

June 19th, 1880, this society was formally organized, with capital stock limited at \$10,000, and with Joshua Van Hoosen, president; Enos R. Mathews, treasurer; Thomas S. Sprague, secretary. Directors for first year—John M. Norton, Joseph H. Holman, Milo P. Newberry, John M. Wilcox, Chester Andrews, Harrison Weaver, and Isaac Barwise. Membership, 279. Entries made at first annual fair, 1,318.

The society leased a lot of 20 acres for fair ground, and built a fine half mile race course thereon, and built fences, art hall, vegetable hall, and horse stalls, cattle stalls, sheep sheds, and hog pens, to the number of 128 during the first year.

RECEIPTS OF THE SOCIETY FOR THE YEAR 1880.

For stock, paid in	\$523 50
“ receipts at first annual fair	762 75
Total	\$1,286 25

DISBURSEMENTS FOR THE YEAR 1880.

For buildings and fences	\$779 41
“ incidentals	127 91
“ premiums	363 75
Total	1,271 40
Leaving balance on hand	\$14 85

Feb. 8th, 1881, the following officers were elected, viz.: Joshua Van Hoosen, president; Enos R. Matthews, treasurer; Thomas S. Sprague, secretary. Directors—John M. Norton, Chester Andrews, Isaac Barwise, O. H. P. Griggs, Loring M. Smith, Harrison Weaver, and George G. Green.

Membership, 239. Entries made at second annual fair, 1,313.

The society built a new art hall and put in a well with pump and wind mill, at a cost of \$828.62, during the year.

RECEIPTS OF THE SOCIETY FOR THE YEAR 1881.

Received at second annual fair	\$1,167 72
“ from stock paid in	2 00
“ from note given	500 00
Total	\$1,669 72

DISBURSEMENTS FOR THE YEAR 1881.

For buildings, etc.	\$828 62
“ incidentals	264 16
“ premiums	561 50
Total	1,654 28
Leaving balance on hand	\$15 44

Feb. 14th, 1882. The following officers were elected—Joshua Van Hoosen President, Enos R. Mathews Treasurer, Thomas S. Sprague Secretary. Directors for third year, John M. Norton, Isaac Barwise, Loring M. Smith, Chester Andrews, O. H. P. Griggf, Joseph G. Toles, H. A. Wells.

April 8th T. S. Sprague-resigned as Secretary and Theodore Dahlmann was elected to fill vacancy caused by said resignation.

Membership 212. Entries made at Third Annual Fair 1,323.

RECEIPTS OF THE SOCIETY FOR THE YEAR 1882.

With Bal on hand from 1881	\$26.44
Received for stock paid in	6.00
Received at Third Annual Fair	942.50
Total	\$974.94

STATE BOARD OF AGRICULTURE.

DISBURSEMENTS FOR THE YEAR 1882.

For incidentals.....	\$274.24
For premiums.....	604.85
Total.....	<u>\$879.09</u>
Leaving balance on hand.....	\$95.85

Jan 9th, 1883. An Amendment to the Articles of Association was adopted, making the Board of Directors to consist of *nine* Stockholders instead of *seven* (as heretofore).

The following officers were then elected, viz.: Joshua Van Hoosen President, Enos R. Mathews Treasurer, Theodor Dahlmann Secretary. Directors for the year—John M. Norton, William C. Flummerfelt, Joseph G. Toles, Chester Andrews, Isaac Barwise, O. H. P. Griggs, H. A. Wells, W. A. Wales, and Gilbert A. Terry. At a meeting of the Directors, Aug. 4th, '83, W. W. Thorington was elected a Director of this Society, to fill vacancy caused by the death of Chester Andrews.

Membership 173. Entries made at the Fourth Annual Fair, 1882.

RECEIPTS FOR THE YEAR 1883.

With balance on hand from 1882.....	\$95.85
For stock paid in.....	3.00
For subscription and notes.....	224.75
For sale of old wind mill.....	25.00
For receipts at fourth annual fair.....	668.25
Total.....	<u>\$1,016.85</u>

DISBURSEMENTS FOR THE YEAR 1883.

For incidentals.....	\$338.09
For ladies' band.....	950.00
For premiums awarded.....	580.45
Total.....	<u>1,013.54</u>
Leaving balance on hand.....	\$3.31

It is conceded by all, that the Fourth Annual Fair was a success, considering—that there were five Fairs held here within a radius of 18 miles, all between Sept. 15th and Oct. 15th, and the very unfavorable weather which attended ours. For our Cattle, Horse, Sheep, Swine, Fruits, Vegetables, and Feed exhibits equaled and exceeded those of our adjoining Fairs, and we confidently believe (the weather being favorable) with the co-operation of our influential men, to be able to make a better showing the next year, as we have the facilities for doing same.

All of which is most respectfully submitted.

Signed at Rochester, Oakland County, Michigan, December 17th, 1883.

J. VAN HOSEN, President.

THEODOR DAHLMANN, Secretary.

The following is a statement showing receipts and expenditures of Union Agricultural society, January 10, 1883 to Dec. 20, 1883:

To receipts from all sources \$6,619.49, as follows:

Stock issued.....	\$30 00
Gate receipts.....	1,980 35
Rent of booths, licenses, &c.....	231 75
Received from grand stand.....	64 55
“ “ dining hall.....	371 24
“ “ horse stalls.....	78 50
Money loaned.....	3,799 00
Received from all other sources.....	64 10
	<hr/>
	\$6,619 49

DISBURSEMENTS.

Paid for printing.....	\$77 17
“ premiums.....	657 00
“ speed premiums.....	206 49
“ for building grand stand.....	564 34
“ “ 16½ acres of land.....	1,619 85
“ contingent orders.....	996 00
“ on indebtedness.....	2,474 64
Amount on hand.....	24 00
	<hr/>
	\$6,619 49

We, the president, secretary, and treasurer of the Union Agricultural society, located at Litchfield, do hereby certify that the above is a correct statement of the receipts and disbursements of said society for the year ending Dec. 20, 1883.

R. W. FREEMAN, *President.*

L. B. AGARD, *Secretary.*

D. H. MILLS, *Treasurer.*

The society held a spring exhibition in May, and a fall fair in October, and this statement includes receipts and expenditures of both.

L. B. AGARD,
Secretary.

LITCHFIELD, Mich., December 20, 1883.

TUSCOLA COUNTY AGRICULTURAL SOCIETY.

The Nineteenth Annual Meeting of the Tuscola County Agricultural Society, was held at the Town Hall, Vassar, on Monday last. The usual business was gone through with. According to the Treasurer's report, a balance of \$57 remains in his hands. Secretary Hayes made the following report.

WHEAT.

The wheat crop of the past year was considerably below an average in quantity, but fair in quality. The frequent and heavy rainfall for weeks previous and up to harvest time not only had a tendency to delay the gathering of the crop, but added materially to the cost of harvesting, especially the running of reapers. During the early part of harvest it was not an uncommon or unusual sight in a wheat field to see a harvester stuck fast in the mud. A few days later the program changed. We learned by experience that this

kind of harvesting was not only slow and expensive, but very unpleasant. A change seemed absolutely necessary. To accomplish this a little more horse power was attached, a little more buckskin applied—more motion produced and the unpleasant task of lifting and prying with rails and planks to remove the machine from the mud was avoided. But the new plan was not entirely successful; the large drive wheel would occasionally encounter low places so thoroughly saturated and filled with water that the earth would give way and the wheel would slide instead of turn. Whenever this would occur, and it was quite often, if a traveler unacquainted with machinery could have passed along he would have been at a loss to tell whether the thing was intended for rolling down and threshing out the wheat or for constructing surface drains. Our last year's wheat crop was perhaps 30,000 acres and 300,000 bushels. Acres now on the ground will but little if any exceed that of last year. The Clawson wheat, after filling our granaries for several years to our entire satisfaction seems to have become less productive. Other varieties are being tried and in many cases with very satisfactory results.

CORN.

When we think of our corn crop it brings to mind the old and familiar saying, a short horse is soon curried. So our corn story is soon told—we had none except in a few favored localities where the water could not remain, and early frost did not kill. At the sheep breeders' convention held at Lansing a short time ago, we met an old friend, a farmer from the southern part of the State. In conversation with him among other things we asked, How was your corn crop last year? His reply was short and prompt, Didn't have any. Well, he said in continuation, I planted 12 acres and had enough soft corn to fill my wagon box twice. Something similar to the above is quite a common expression with our farmers, and I merely repeat what he said to show that other localities and much further south have suffered equally with our county. You may consider it a little out of order here at this time and on this occasion, but we hope and trust you will pardon us for saying a few words to our brother farmers in regard to our next corn crop. It would be a hard blow to our county if the next crop should be even a partial failure; there would be no old corn, as there is now, to fall back on. In a little more than one hundred days from now you will be preparing your fields for planting. But it is not your fields, your acres, your time for, or mode of planting that I wish to call your attention to—it is your seed corn. Have you got good sound corn of this year's growth? Is it thoroughly dried? Are you keeping it where severe freezing will not injure it if the mercury happens to drop an inch below zero? If you are depending on old corn for seed do you know that it had germinating qualities last year? Are you sure it will grow this year? If you are not supplied with either, procure some at once. And if you have the least doubt about the germinating qualities of your corn, test it by placing a handful between two rags keeping them moist, in a dish by the side of a stove.

OATS.

The oat crop was more than an average, and of fine quality.

FRUIT.

Apples were not more than twenty per cent of an average crop. In a few favored localities the peach crop was quite good; in others almost or quite a

failure. With the exception of plums, the smaller fruits were nearly an average crop.

HORSES.

At the present time our supply of horses seems to be equal to, or exceed the demand. That we are producing a larger class of horses is evident to everyone with an observing or enquiring turn of mind. In visiting the barnyards of our farmers we frequently have our attention called to one or more fine specimens of (grade) Percheron Norman colts. We felt a little pride as well as pleasure over a conversation we heard a few days ago at Durand, a lunch station between Flint and Lansing. Two strangers came in and stated that they wished to purchase a few good work horses—that they had recently bought some farms in this State, and were in pursuit of some horses to stock them with.

After a few minutes conversation, and no one seeming to know where to direct the stranger, a gentleman sitting near me said: "I am pretty well acquainted through this section, and have traveled considerably in this State; have recently been through the northern part, and if I was going to look for a few good, young working horses, I would go up into Tuscola county."

When he had finished his conversation with the stranger, I informed him that I resided in that county. Continuing the conversation he said: "I have just been through Tuscola county, went as far north as Unionville, and I not only saw more good, young horses, but I saw farms with better buildings, better fences, and under a finer state of cultivation, than any place I have visited in the State.

CATTLE.

In department three, Durhams, there were thirty-five entries, and nineteen premiums awarded, amounting to \$56. In all other full blooded departments, including Devons, Holsteins, Jerseys, etc., although twenty-eight premiums were offered, amounting to \$60, only six entries were made, and less than \$20 awarded. With these facts and figures before you, it is entirely useless for me to speak of the best breeds of cattle.

SHEEP.

Our sheep classes run from ten to fifteen inclusive. We offer seventy-two premiums, amounting to \$164. In class ten, full blood American Merinoes, there were thirteen entries, and twelve awards. In all other classes, including Leicesters, Lincolns, Cotswolds, Southdowns, and Shropshires, there were only two entries. The Merinoes, full blood, and graded like the Durham cattle, seem to have the floor, and our farmers are inclined to let them keep it.

SWINE.

The entry of hogs with pedigrees, consisted of Suffolk, Poland China, Cheshire, Yorkshire, and Jersey Red.

POULTRY.

In this class there were eighty-two entries, consisting of light Brahmas, dark Brahmas, Cochins (buff and partridge), Spanish, Poland, Leghorns, (white and brown), Plymouth Rocks, Hamburgs, etc.

MANUFACTURES.

It is not necessary or essential that we should, at this time, enter into a long list of manufactured goods, but standing as we do, here to-day, in full view of the recently constructed, commodious and beautiful as well as costly structures, the woolen factory just completed by North & Seldon, and the roller process flouring mill of McHose, we can hardly pass them by in silence. The extra quality of goods manufactured by the former for several years past, has not only given the establishment a reputation, but has secured for it a good county and State trade. After viewing the machinery of the latter, and enquiring as to its capacity, we make a few figures with the end of our finger in dust or flour that had fallen on the head of a barrel, and the result shows that the machinery of this mill is capable of manufacturing into flour, a quantity of wheat equal to the entire crop of our county, as it has averaged for the past five or seven years.

Our fair was held at Vassar, on the grounds of Recreation Park Association, on October 2, 3, 4, and 5. The weather was all that could be desired, being moderately cool and very pleasant. Our financial condition will be shown by the treasurer's report, which I believe is ready to follow this.

We have appeared before you to-day in an official capacity, in conformity to our by-laws, for the purpose of reading to you our eighteenth annual report. Ten out of the eighteen being read to you by me, it is reasonable to suppose that it has assumed a sameness, and is becoming tedious for you to hear. Your almost or quite unanimous vote on several occasions, in placing me in this position, has afforded me much pleasure. After thanking you more than as many times as you have conferred upon me this honor, I believe that I have good reasons for asking and insisting that I be relieved from this position after the present term.

E. B. HAYES,
Secretary.

VASSAR, January 14, 1884.

REGISTER OF
METEOROLOGICAL OBSERVATIONS,
FOR THE YEAR 1883,

TAKEN AT THE

State Agricultural College of Michigan,

BY R. C. KEDZIE,

PROF. OF CHEMISTRY.

LATITUDE $42^{\circ} 43' 56''$; LONGITUDE $7^{\circ} 25' 59''$ WEST OF WASHINGTON.

Height above the Sea, 834 feet.

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				RELATIVE HUMIDITY OR PER CENT OF SATURATION.			PRESSURE OF VAPOR, IN INCHES.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	14	25	14	17 $\frac{1}{2}$	100	100	100	.082	.135	.082	29.200	29.274	29.281	29.282
2	16	23	12	17	100	100	100	.090	.123	.075	29.413	29.512	29.270	29.332
3	22	28	10	20	86	77	79	.101	.117	.054	29.195	29.262	29.487	29.315
4	4	12	14	10	100	80	100	.052	.060	.082	29.587	29.469	29.337	29.464
5	14	18	17	16 $\frac{1}{2}$	100	100	100	.082	.098	.094	29.262	29.224	29.236	29.241
6	17	25	23	21 $\frac{1}{2}$	100	100	100	.094	.135	.123	29.081	28.883	28.818	28.927
7	23	24	10	19	100	100	100	.123	.129	.068	28.961	29.156	29.221	29.113
8	14	18	2	11 $\frac{1}{2}$	100	68	100	.082	.067	.048	29.232	29.185	29.237	29.218
9	-10	15	2	2 $\frac{1}{2}$	100	65	100	.068	.055	.048	29.249	29.050	28.961	29.087
10	10	20	13	14 $\frac{1}{2}$	100	100	100	.068	.108	.078	28.617	28.645	28.783	28.682
11	6	21	13	13 $\frac{1}{2}$	100	86	100	.057	.096	.078	29.101	29.204	29.362	29.223
12	14	17	21	17 $\frac{1}{2}$	100	83	86	.082	.078	.096	29.292	29.182	28.966	29.147
13	35	23	12	23 $\frac{1}{2}$	100	86	100	.204	.106	.075	28.598	28.711	28.876	28.728
14	14	18	4	12	100	68	100	.082	.067	.032	29.172	29.217	29.315	29.245
15	5	16	3	8	100	66	100	.035	.029	.050	29.459	29.524	29.422	29.468
16	11	26	21	19 $\frac{1}{2}$	100	75	100	.071	.105	.113	29.392	29.108	28.911	29.137
17	23	32	22	25 $\frac{1}{2}$	100	89	86	.123	.150	.101	28.731	28.507	28.791	28.676
18	2	23	21	15 $\frac{1}{2}$	100	86	86	.048	.106	.096	29.329	29.371	29.378	29.359
19	21	31	14	22	86	79	100	.096	.136	.082	29.111	29.185	29.287	29.194
20	12	20	17	16 $\frac{1}{2}$	100	100	100	.075	.108	.094	29.180	28.728	28.622	28.843
21	-9	-4	-4	-5 $\frac{1}{2}$	100	100	100	.029	.036	.036	29.013	29.079	29.158	29.083
22	-17	-8	-11	-12	100	100	100	.021	.031	.027	29.353	29.394	29.378	29.375
23	-14	4	-6	-5 $\frac{1}{2}$	100	100	100	.024	.052	.033	29.323	29.440	29.498	29.420
24	0	16	8	8	100	100	100	.044	.090	.062	29.248	29.036	29.285	29.190
25	0	12	-4	2 $\frac{1}{2}$	100	80	100	.044	.060	.036	29.392	29.387	29.400	29.396
26	-4	18	24	12 $\frac{1}{2}$	100	84	100	.036	.082	.129	29.366	29.116	28.943	29.142
27	32	32	25	29 $\frac{1}{2}$	100	100	100	.181	.181	.135	28.949	29.044	29.091	29.028
28	22	30	20	24	100	78	100	.118	.130	.103	29.124	29.062	29.018	29.078
29	14	32	28	24 $\frac{1}{2}$	100	89	100	.082	.162	.153	29.001	28.968	28.918	28.962
30	32	36	28	32	100	100	100	.181	.212	.153	28.741	28.685	28.640	28.689
31	14	17	8	13	100	83	100	.082	.078	.062	28.889	28.923	29.084	28.965
Sums.	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Means	-----	-----	-----	14° 39'	99	88	98	.083	.068	.081	-----	-----	-----	29.129
Average-----					95			.077			-----			

THE MONTH OF JANUARY, 1883.

CLOUDS.						WINDS.						OZONE.		REGISTER- ING THER- MOMETER.		RAIN AND SNOW.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.	2 P. M.	9 P. M.	Day: 7 A. M. to 2 P. M.		Night: 9 P. M. to 7 A. M.	Maximum.	Minimum.	Beginning, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain and Melt'd Snow.	Depth of Snow, in.		
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.								
90	St.	60	Cu. St.	00	-----	s w	9	w	8	---	0	26	12						
100	St.	20	Cir. St.	00	-----	s w	4	w	8	w	8	23	12						
100	St.	30	St.			s w	12	w	16	---	0	28	1						
90	St.	30	Cir. St.	100	Nim.	E	2	E	8	E	7	14	4	7 P. M.	10 P. M.	.52	3		
100	St.	100	St.	100	St.	E	4	E	0	---	0	19	14						
100	St.	100	Nim.	100	St.	---	0	w	6	w	3	25	17						
100	Nim.	80	St.	00	-----	w	4	w	6	---	0	24	10	Snow	flurri	es.			
100	St.	50	Cir. Cu.	00	-----	---	0	w	8	---	0	20	-11						
10	St.	00	-----	00	-----	---	0	w	4	---	0	15	-10						
100	St.	100	St.	100	St.	s E	0	E	12	N E	4	20	0						
90	St.	10	Cir.	90	Cu. St.	---	0	s w	4	s w	3	22	6						
100	St.	100	St.	100	Nim.	s	1	s E	12	s E	8	25	14	7 P. M.	11 P. M.	.25	2		
100	Nim.	70	Cu. St.	100	Nim.	s w	5	s w	16	s w	4	35	11	Snow	flurri	es.			
00	-----	70	St.	00	-----	s w	4	s w	8	s w	6	18	0						
100	St.	20	St.	60	St.	s w	3	s w	10	---	0	16	1						
100	St.	80	St.	100	St.	E	2	s E	4	s E	1	28	10	Snow.					
100	St.	100	St.	25	C.	s E	3	w	6	s w	12	32	-1		10 A. M.	.36	4		
00	-----	20	Cir. St.	100	St.	---	0	E	4	E	8	22	2						
100	Nim.	100	St.	00	-----	E	2	s w	8	---	0	31	10						
100	St.	100	Nim.	100	Cu. St.	---	0	E	2	N E	12	25	-9	SA. M.	5 P. M.				
20	St.	00	-----	100	Nim.	s w	16	s w	16	s w	12	-4	-10						
10	St.	90	St.			s w	16	s w	16	s w	4	-8	-17						
30	St.	80	Cu. St.	30	Cir. Cu.	s w	6	s w	12	s w	8	-5	-14	5 A. M.	10 A. M.	.10	1		
100	Nim.	100	St.	100	St.	s w	8	s w	16	s w	4	17	-2						
50	St.	60	St.	20	St.	---	0	w	8	---	0	12	-16						
90	St.	90	Cu. St.	100	Nim.	E	1	s E	12	s E	16	35	-4	7 P. M.					
100	Nim.	100	St.	100	St.	w	16	w	12	w	8	32	21		9 A. M.	.30			
100	St.	20	Cir. St.	00	-----	w	1	s w	4	---	0	31	13						
20	St.	90	Cu. St.	10	St.	---	0	---	0	---	0	32	14						
100	St.	100	Nim.	100	Cu. St.	s E	12	s	12	s w	12	41	5						
100	Nim.	100	Nim.	100	Nim.	s w	20	s w	24	s w	12	4							
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	1.53	-----		
77	-----	67	-----	56	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----		

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				RELATIVE HUMID- ITY, OR PER CENT OF SATURATION.			PRESSURE OF VAPOR, IN INCHES.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	8	10	7	8½	100	100	100	.062	.068	.060	29.380	29.422	29.573	29.458
2	9	12	10	10½	100	100	100	.065	.075	.068	29.575	29.494	29.347	29.472
3	15	24	20	19½	100	87	100	.086	.111	.108	29.114	29.098	29.043	29.095
4	10	20	6	12	100	100	100	.068	.108	.037	29.342	29.517	29.522	29.460
5	6	8	-2	4	100	100	100	.057	.062	.040	29.470	29.432	29.473	29.458
6	-4	18	14	9½	100	70	100	.036	.075	.082	29.338	29.148	28.923	29.136
7	9	21	9	13	100	86	100	.065	.101	.065	29.096	29.043	29.126	29.088
8	3	21	13	12½	100	86	100	.050	.101	.078	29.210	29.255	29.318	29.261
9	15	18	5	12½	100	100	100	.086	.098	.055	29.335	29.499	29.557	29.484
10	-2	14	12	8	100	82	100	.040	.067	.075	29.560	29.276	29.146	29.327
11	21	32	21	24½	100	69	100	.113	.035	.113	28.843	28.833	29.094	28.923
12	-5	26	3	8	100	75	100	.035	.105	.050	29.476	29.480	29.494	29.483
13	9	32	32	24½	100	89	100	.065	.162	.181	29.442	29.344	29.098	29.295
14	32	33	32	32½	100	100	100	.181	.188	.181	28.873	28.788	28.811	28.824
15	32	38	35	35	100	100	100	.181	.165	.204	28.913	28.973	29.020	28.969
16	50	44	42	45½	100	100	100	.361	.289	.267	28.770	28.788	28.828	28.795
17	20	21	14	18½	100	100	100	.108	.113	.082	29.288	29.512	29.639	29.480
18	11	21	17	16½	100	71	100	.071	.001	.094	29.653	29.629	29.564	29.615
19	22	31	19	24	100	79	100	.118	.136	.103	29.518	29.517	29.449	29.495
20	27	38	22	29	100	63	100	.147	.144	.118	29.213	29.008	29.181	29.131
21	16	29	21	23	100	78	87	.090	.123	.111	29.257	29.222	29.128	29.202
22	25	30	18	24½	100	68	100	.135	.111	.098	28.977	29.025	29.204	29.069
23	7	24	18	16½	100	61	100	.060	.077	.098	29.448	29.476	29.444	29.456
24	18	30	37	28½	84	100	100	.082	.167	.221	29.291	28.898	28.713	28.967
25	27	26	22	25	100	88	100	.147	.123	.118	28.923	29.111	29.190	29.075
26	17	21	12	16½	83	57	100	.078	.064	.075	29.251	29.378	29.514	29.381
27	11	22	28	20½	100	86	100	.071	.101	.153	29.486	29.597	29.348	29.410
28	30	37	30	32½	89	53	78	.148	.116	.130	29.250	29.230	29.232	29.234
29	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
30	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
31	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sums.	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Means	-----	-----	-----	19° 76	98	83	99	.100	.110	.109	-----	-----	-----	29.252
Average.....					93			.106			-----			

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				RELATIVE HUMID- ITY, OR PER CENT OF SATURATION.			PRESSURE OF VAPOR, IN INCHES.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	32	47	37	38½	89	62	82	.162	.202	.195	29.230	29.419	29.031	29.227
2	32	37	29	32½	79	53	89	.143	.116	.142	29.243	29.281	29.376	29.300
3	15	31	27	24½	100	79	76	.086	.136	.111	29.437	29.370	29.262	29.356
4	18	21	12	17	100	57	100	.098	.064	.075	29.283	29.361	29.496	29.380
5	3	28	18	16½	100	66	100	.050	.099	.098	29.513	29.293	29.189	29.332
6	24	36	24	28	100	90	100	.129	.191	.129	28.744	28.655	28.870	28.756
7	6	16	3	8½	100	33	100	.057	.028	.050	29.353	29.496	29.526	29.458
8	-3	27	13	12½	100	76	100	.038	.111	.078	29.463	29.346	29.266	29.358
9	20	44	32	32	85	52	100	.012	.151	.181	29.139	28.686	28.655	28.827
10	32	35	22	29½	79	90	86	.143	.183	.101	28.492	28.469	28.648	28.536
11	18	26	19	21	100	75	85	.098	.105	.087	28.948	29.063	29.186	29.066
12	22	33	33	29½	100	89	89	.118	.168	.168	29.094	29.003	29.003	29.033
13	16	42	28	28½	100	58	100	.090	.155	.153	29.055	29.063	29.045	29.054
14	32	52	36	40	79	66	90	.143	.257	.191	28.898	28.761	28.688	28.782
15	24	24	20	22½	87	100	100	.111	.129	.108	28.956	29.091	29.172	29.073
16	13	32	25	23½	100	79	75	.078	.143	.108	29.161	29.068	28.968	29.066
17	30	43	42	38½	100	59	66	.167	.164	.177	28.801	28.625	28.555	28.660
18	43	19	7	23	75	100	100	.209	.193	.060	28.595	28.805	29.068	28.823
19	3	16	4	7½	100	100	100	.050	.090	.052	29.036	28.930	28.938	28.968
20	-5	20	15	10	100	70	100	.035	.075	.086	28.967	28.962	29.013	28.981
21	10	25	12	15½	100	59	100	.063	.066	.075	29.108	29.128	29.143	29.126
22	11	33	27	23½	100	79	100	.071	.150	.147	29.064	28.853	28.713	28.877
23	14	28	19	20½	100	43	69	.082	.065	.071	28.761	28.918	29.148	28.942
24	8	34	23	21½	100	52	86	.062	.101	.106	29.292	29.228	29.204	29.241
25	28	43	33	34½	77	51	70	.117	.142	.131	29.151	29.087	29.088	29.109
26	30	32	33	31½	100	100	89	.167	.181	.168	29.023	29.072	29.097	29.064
27	24	33	24	27	87	89	100	.111	.168	.129	29.154	29.155	29.166	29.158
28	21	35	29	28½	100	70	78	.113	.142	.123	29.169	29.146	29.108	29.141
29	25	38	24	29	100	54	100	.135	.123	.129	29.073	29.032	28.998	29.034
30	23	35	30	29½	100	70	78	.123	.142	.130	28.968	28.992	29.035	28.998
31	25	34	22	27	100	43	72	.135	.083	.084	29.075	29.077	29.131	29.094
Sums.	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Means	-----	-----	-----	24.89	95	70	90	.103	.130	.117	-----	-----	-----	29.039
Average	-----				85			.113			-----			

THE MONTH OF MARCH, 1883.

CLOUDS.						WINDS.						OZONE.		REGISTER- ING THER- MOMETER.		RAIN AND SNOW.				
7 A. M.		2 P. M.		9 P. M.		7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Day: 7 A. M. to 2 P. M.	Night: 9 P. M. to 7 A. M.	Maximum.	Minimum.	Beginning, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain or Melt'd Snow.	Depth of Snow, In.	
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.									
00	-----	20	St.	60	-----	s w	2	s w	12	s w	6	-----	-----	47	30	-----	-----	-----	-----	
00	-----	40	Cu.	00	-----	0	N w	2	N	N	N	-----	-----	40	12	-----	-----	-----	-----	
80	St.	90	Cu.	90	St.	w	4	s w	16	s w	8	-----	-----	31	15	-----	-----	-----	-----	
100	Nim.	10	Cu.	00	-----	N E	8	N	6	N E	6	-----	-----	32	-1	5 A.M.	9 A.M.	.13	1½	
5	St.	00	-----	00	-----	0	w	6	N w	8	-----	-----	28	3	-----	-----	-----	-----		
100	Nim.	100	Cu. St.	00	-----	s	6	w	20	w	8	-----	-----	36	6	6 A.M.	11 A. M.	.18	1½	
00	-----	20	Cu.	00	-----	w	8	w	12	0	0	-----	-----	16	-8	-----	-----	-----	-----	
80	St.	90	Cu. St.	00	-----	0	s	8	0	0	0	-----	-----	23	3	-----	-----	-----	-----	
40	Cu. St.	10	Cu.	100	Cu. St.	s	8	s	20	s w	4	-----	-----	44	20	-----	-----	-----	-----	
100	Nim.	90	Nim.	10	St.	w	2	w	8	w	16	-----	-----	32	15	6 A.M.	4 P.M.	.10	1	
20	Cir. St.	100	St.	00	-----	N w	16	w	16	N w	6	-----	-----	22	18	-----	-----	-----	-----	
100	St.	80	Cu. St.	00	-----	w	16	s w	20	0	0	-----	-----	33	15	-----	-----	-----	-----	
10	St.	20	Cu. St.	00	-----	0	s w	12	0	0	0	-----	-----	42	16	-----	-----	-----	-----	
00	-----	10	Cir. St.	00	-----	s w	12	s w	20	N w	12	-----	-----	52	24	-----	-----	-----	-----	
70	St.	100	St.	00	-----	w	4	N w	16	N w	8	-----	-----	25	11	-----	-----	-----	-----	
10	St.	100	St.	60	St.	s w	2	w	16	s w	12	-----	-----	32	13	-----	-----	-----	-----	
100	St.	30	Cu.	00	-----	s w	8	s w	16	s w	24	-----	-----	44	30	-----	-----	-----	-----	
100	Cu. St.	100	Cu. St.	100	Nim.	s w	8	N E	16	N E	12	-----	-----	46	3	10 A. M.	-----	-----	-----	
100	Nim.	90	Cu. St.	00	-----	N E	12	N	12	N	1	-----	-----	16	-8	-----	10 A. M.	.15	2	
00	-----	50	Cu. St.	00	-----	s w	1	N w	3	0	0	-----	-----	26	-5	-----	-----	-----	-----	
90	Cu. St.	60	Cir. Cu.	00	-----	N	4	N w	3	0	0	-----	-----	23	6	-----	-----	-----	-----	
70	St.	90	Cu. St.	100	Nim.	s	6	s	12	s w	4	-----	-----	33	10	3 P.M.	10 P. M.	.15	2½	
20	St.	20	St.	00	-----	w	12	N E	16	0	0	-----	-----	32	5	-----	-----	-----	-----	
00	-----	10	Cir.	00	-----	0	E	6	0	0	0	-----	-----	36	8	-----	-----	-----	-----	
100	St.	100	St.	100	St.	s	1	s E	4	0	0	-----	-----	44	28	-----	-----	-----	-----	
100	St.	100	Nim.	100	Cu. St.	N E	4	0	0	N w	4	-----	-----	39	23	-----	-----	-----	-----	
100	St.	50	Cir. Cu.	00	-----	N E	8	N w	12	0	0	-----	-----	33	16	-----	-----	-----	-----	
90	St.	100	St.	80	Cu. St.	N	3	N	3	0	0	-----	-----	36	21	-----	-----	-----	-----	
00	-----	90	Cu. St.	00	-----	0	s w	2	0	0	0	-----	-----	41	22	-----	-----	-----	-----	
100	St.	10	St.	00	-----	N E	8	N	8	N E	3	-----	-----	35	23	-----	-----	-----	-----	
100	St.	40	Cir. Cu.	100	St.	N E	8	N	6	N	8	-----	-----	34	21	-----	-----	-----	-----	
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	.71	8½	
58	-----	59	-----	27	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				RELATIVE HUMIDITY, OR PER CENT OF SATURATION.			PRESSURE OF VAPOR, IN INCHES.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	22	30	20	24	72	78	100	.087	.130	.108	29.214	29.241	29.276	29.244
2	19	37	24	26½	100	71	87	.103	.157	.111	29.292	29.258	29.255	29.268
3	27	44	32	34½	76	52	100	.111	.151	.181	29.262	29.246	29.236	29.248
4	35	54	46	45	90	67	84	.183	.282	.262	29.153	28.985	28.918	29.019
5	47	57	36	46½	100	94	100	.323	.436	.212	28.803	28.800	28.908	28.837
6	32	42	23	34	100	42	100	.181	.113	.153	29.053	29.025	29.008	29.020
7	31	40	33	34½	89	56	70	.155	.139	.131	29.043	29.068	29.118	29.076
8	35	53	44	44	90	48	60	.183	.104	.173	29.260	29.224	29.196	29.227
9	44	67	50	53½	68	21	65	.215	.136	.234	29.086	28.985	28.997	29.023
10	44	68	57	56½	84	47	81	.241	.346	.378	28.995	28.892	28.609	28.832
11	35	47	39	40½	70	62	73	.142	.202	.173	28.638	28.792	28.938	28.789
12	37	57	46	46½	81	41	54	.178	.191	.169	28.993	29.022	29.088	29.034
13	43	49	47	46½	75	85	70	.209	.321	.225	29.143	29.022	29.078	29.081
14	55	83	72	70	87	53	76	.376	.610	.595	29.088	28.997	28.950	29.012
15	61	59	46	55½	82	54	69	.442	.269	.215	28.892	28.938	29.025	28.952
16	42	54	38	44½	83	43	81	.222	.181	.186	29.029	29.035	29.108	29.037
17	48	63	47	52½	70	52	48	.236	.299	.156	29.108	29.128	29.132	29.123
18	49	65	46	53½	51	35	84	.175	.216	.262	29.130	28.988	28.877	28.998
19	43	52	46	47	92	73	77	.257	.282	.238	28.828	28.882	28.972	28.894
20	34	51	45	43½	70	34	61	.138	.126	.182	29.118	29.123	29.120	29.120
21	45	57	45	49	68	33	46	.204	.166	.138	29.194	29.140	29.120	29.151
22	41	43	35	39½	49	36	45	.126	.100	.089	28.963	28.943	28.938	28.958
23	31	38	23	30½	69	45	86	.118	.103	.106	28.905	28.938	29.068	28.950
24	28	36	29	31	77	71	100	.117	.149	.160	29.008	29.025	29.078	29.037
25	33	54	38	41½	100	15	63	.188	.065	.144	29.133	29.153	29.174	29.153
26	43	54	40	45½	67	61	73	.186	.256	.182	29.063	28.975	29.128	29.055
27	42	52	45	46½	83	79	92	.222	.308	.275	28.948	28.905	28.880	28.911
28	37	44	30	37	100	68	78	.221	.196	.130	28.905	28.953	29.050	28.969
29	37	47	37	40½	53	41	63	.116	.133	.136	29.113	29.102	29.113	29.109
30	35	56	41	44	80	40	63	.162	.179	.169	29.148	29.121	29.156	29.142
31	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sums.	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Means	-----	-----	-----	43.48	79	53	75	.193	.207	.195	-----	-----	-----	29.042
Average.....					69			.198			-----			

THE MONTH OF APRIL, 1883.

CLOUDS.						WINDS.						OZONE.		REGISTER- ING THER- MOMETER.		RAIN AND SNOW.				
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.		Day: 7 A. M. to 2 P. M.	Night: 9 P. M. to 7 A. M.	Maximum.	Minimum.	Beginning, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain or Melt'd Snow.	Depth of Snow, In.	
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.									
100	Cir. St.	70	Cir. St.	80	Cir. St.	N E	8	N E	8	N E	4	---	---	32	14	---	---	---	---	
00	---	60	Cir. St.	---	---	---	3	N E	3	N E	1	---	---	46	19	---	---	---	---	
60	Cir. St.	100	Cu. St.	100	Nim.	S W	6	S W	8	S W	4	---	---	45	25	---	---	---	---	
100	Cu. St.	100	Cu. St.	100	Cu. St.	S W	4	S W	12	S W	4	---	---	58	32	In	night.	.25	---	
100	Cu. St.	100	Fog.	100	Nim.	---	0	N E	8	N E	6	---	---	59	30	---	---	---	---	
90	Cir. St.	100	Cu. St.	100	Nim.	N E	4	N E	8	N E	6	---	---	42	28	4 P.M.	11 P. M.	.35	2½	
80	Cu. St.	80	Cu. St.	00	---	W	2	N W	4	---	0	---	---	44	27	---	---	---	---	
00	---	00	---	40	St.	S W	6	S W	12	S W	12	---	---	54	35	---	---	---	---	
10	Cir. St.	00	---	00	---	S W	12	S W	16	---	0	---	---	68	41	---	---	---	---	
60	St.	30	Cir. Cu.	90	Cu. St.	---	0	S	16	S W	16	---	---	68	35	---	---	---	---	
100	Cu. St.	40	Cu.	00	---	S W	24	W	28	---	0	---	---	50	27	---	---	---	---	
20	St.	20	Cir. St.	10	Cir. St.	E	5	E	4	S E	4	---	---	58	37	---	---	---	---	
100	St.	100	Nim.	00	---	E	8	S E	12	S W	8	---	---	55	43	---	---	---	---	
70	St.	10	Cu.	60	St.	S E	6	S	24	S	16	---	---	83	55	In	night.	.41	---	
100	Cu. St.	60	Cu.	00	---	S W	20	S W	20	S W	12	---	---	61	37	---	---	---	---	
10	St.	30	Cu.	00	---	S W	12	W	24	---	0	---	---	55	35	---	---	---	---	
00	---	00	---	00	---	W	12	N W	12	---	0	---	---	64	40	---	---	---	---	
90	St.	90	St.	100	St.	S E	8	S E	8	N E	8	---	---	67	42	7 P.M.	---	---	---	
100	Nim.	90	Cu. St.	90	Cu. St.	N E	6	N	8	N	5	---	---	55	29	---	9 A.M.	.24	---	
10	St.	95	Cir. St.	100	St.	N	6	W	3	---	0	---	---	55	41	---	---	---	---	
80	St.	10	St.	70	St.	---	0	E	8	E	8	---	---	59	39	---	---	---	---	
100	St.	100	St.	60	St.	N E	12	N E	12	N E	8	---	---	44	28	---	---	---	---	
50	St.	60	Cu.	00	---	N E	16	N E	12	N E	1	---	---	39	24	---	---	---	---	
50	Cir. St.	100	Cu. St.	00	---	N W	12	W	16	---	0	---	---	38	27	---	---	---	---	
00	---	40	Cu.	00	---	N W	12	W	16	---	0	---	---	54	33	---	---	---	---	
100	St.	100	Nim.	10	Cir. St.	S E	12	W	20	---	0	---	---	58	35	---	---	---	---	
90	Cu. St.	100	Cu. St.	100	Nim.	W	6	N W	12	---	0	---	---	60	37	6 P.M.	---	---	---	
100	Nim.	60	Cu.	20	Cir. Cu.	N E	8	N E	12	---	0	---	---	44	24	---	9 A.M.	.63	---	
00	---	20	Cu.	00	---	N W	3	N	6	---	0	---	---	52	26	---	---	---	---	
100	Cu. St.	100	Cu. St.	00	---	---	0	S W	12	---	0	---	---	56	30	---	---	---	---	
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
60	---	62	---	41	---	---	---	---	---	---	---	---	---	---	---	---	---	1.00	2½	

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				RELATIVE HUMIDITY OR PER CENT OF SATURATION.			PRESSURE OF VAPOR IN INCHES.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	36	64	52	50 $\frac{1}{2}$	80	43	47	.170	.257	.183	29.247	29.206	29.154	29.202
2	48	61	43	50 $\frac{1}{2}$	70	71	100	.285	.383	.278	29.133	29.110	29.150	29.131
3	42	44	37	41	100	92	100	.241	.265	.221	29.005	29.067	29.122	29.065
4	41	57	52	50	100	81	100	.257	.249	.388	29.113	28.998	28.903	29.005
5	42	54	49	48 $\frac{1}{2}$	91	61	93	.244	.256	.322	29.113	29.169	29.308	29.197
6	54	66	52	57 $\frac{1}{2}$	74	45	100	.308	.287	.388	29.352	29.284	29.166	29.267
7	50	71	58	59 $\frac{1}{2}$	100	62	76	.361	.460	.365	28.913	28.880	28.998	28.930
8	46	62	50	52 $\frac{1}{2}$	77	61	100	.238	.340	.361	29.085	29.050	29.075	29.070
9	44	60	55	53	92	60	68	.265	.310	.295	29.110	29.038	28.850	28.999
10	58	66	40	54 $\frac{1}{2}$	94	89	82	.452	.570	.203	28.821	28.738	29.090	28.883
11	41	53	41	45	74	48	65	.190	.194	.169	29.189	29.176	29.164	29.176
12	45	56	41	47 $\frac{1}{2}$	84	40	57	.251	.179	.147	29.103	29.093	29.156	29.117
13	40	56	47	47 $\frac{1}{2}$	65	35	62	.160	.155	.202	29.267	29.178	29.115	29.187
14	42	45	42	43	83	81	74	.222	.251	.199	28.915	28.743	28.695	28.784
15	39	58	46	47 $\frac{1}{2}$	100	48	54	.233	.229	.272	28.833	28.953	29.120	28.969
16	44	62	55	53 $\frac{1}{2}$	60	36	72	.173	.202	.258	29.226	29.223	29.216	29.222
17	50	72	59	60 $\frac{1}{2}$	52	12	38	.186	.097	.190	29.229	29.175	29.128	29.177
18	59	65	68	64	54	73	70	.269	.451	.476	29.020	28.887	28.800	28.902
19	66	80	63	69 $\frac{1}{2}$	81	48	94	.536	.487	.543	28.767	28.745	28.758	28.757
20	57	58	43	52 $\frac{1}{2}$	87	64	100	.407	.309	.278	28.705	28.723	28.778	28.735
21	32	40	41	37 $\frac{1}{2}$	100	65	49	.181	.160	.126	28.883	28.880	28.933	28.869
22	37	46	39	40 $\frac{1}{2}$	71	69	91	.157	.215	.112	28.938	28.953	29.008	28.966
23	46	64	52	54	69	34	41	.215	.203	.159	29.021	29.008	29.043	29.024
24	47	73	63	61	70	39	52	.225	.313	.299	29.123	29.055	29.038	29.072
25	62	77	63	67 $\frac{1}{2}$	77	57	94	.429	.527	.543	29.010	28.915	28.887	28.937
26	52	62	50	54 $\frac{1}{2}$	100	72	86	.388	.399	.309	28.812	28.802	28.865	28.826
27	58	67	51	58 $\frac{1}{2}$	88	72	65	.423	.333	.245	28.843	28.775	28.805	28.808
28	52	63	52	55 $\frac{1}{2}$	86	62	86	.334	.356	.334	28.825	28.831	28.755	28.804
29	51	65	52	56	72	54	93	.270	.330	.361	28.908	29.005	29.085	28.999
30	58	63	50	57	88	52	93	.423	.299	.335	29.043	28.935	28.895	28.958
31	50	60	42	50 $\frac{1}{2}$	93	60	83	.335	.231	.222	29.031	29.120	29.252	29.134
Sums.	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Mean.	-----	-----	-----	52 $^{\circ}$.78	82	58	77	.285	.300	.283	-----	-----	-----	29.007
Average	-----	-----	-----	-----	72	-----	-----	.289	-----	-----	-----	-----	-----	-----

THE MONTH OF MAY, 1883.

CLOUDS.						WINDS.						OZONE.		REGISTER- ING THER- MOMETER.	RAIN AND SNOW.				
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.		Day: 7 A. M. to 2 P. M. Night: 9 P. M. to 7 A. M.		Maximum.	Minimum.	Beginning, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain or Melted Snow.	Depth of Snow, In.
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.								
70	St.	70	Cu. St.	100	St.	N E	5	S W	6	S W	8	---	---	64	36	---	---	---	---
100	Nim.	100	Nim.	100	Nim.	S	2	S W	4	N E	8	---	---	67	40	7 A.M.	---	---	---
100	Nim.	100	Nim.	100	Nim.	N E	6	N E	12	N E	8	---	---	44	36	---	---	---	---
100	Nim.	100	Cu. St.	100	Nim.	N E	8	S E	12	N E	12	---	---	57	39	---	10 P. M.	1.50	---
80	Cu. St.	80	Cu. St.	100	---	W	16	W	16	---	0	---	---	57	37	---	---	---	---
10	St.	60	Cu. Cir.	100	Nim.	W	6	W	8	---	0	---	---	66	49	7 P.M.	---	---	---
100	Nim.	10	Cu.	60	Cu. St.	S	16	W	16	E	12	---	---	72	41	---	9 A.M.	.63	---
100	St.	90	Cu. St.	100	Nim.	---	0	W	6	---	0	---	---	62	42	5 P.M.	---	---	---
100	Nim.	40	Cir. St.	100	Cu. St.	E	12	E	12	E	16	---	---	62	42	---	10 A. M.	.78	---
40	St.	100	Nim.	00	---	S	20	S	12	N W	16	---	---	70	33	2 P.M.	4 P.M.	.40	---
00	---	30	Cu.	10	St.	---	0	W	16	---	0	---	---	54	36	---	---	---	---
20	St.	40	Cu.	00	---	S W	8	N W	16	---	0	---	---	56	31	---	---	---	---
5	St.	70	Cu. St.	100	Cu. St.	N W	8	E	4	E	8	---	---	56	39	---	---	---	---
100	Nim.	100	Nim.	100	Cu. St.	S E	8	E	8	N E	8	---	---	45	28	6 A.M.	---	---	---
100	Nim.	15	Cu.	10	Cir.	N E	12	N W	8	---	0	---	---	58	39	---	8 A.M.	.90	---
00	---	50	Cir.	20	Cir.	N W	8	N E	5	N E	10	---	---	63	42	---	---	---	---
30	Cir. St.	60	Cir. St.	100	Cir. St.	S	11	S E	10	S E	16	---	---	72	48	---	---	---	---
100	Nim.	80	Cir. Cu.	20	Cir. St.	S W	20	S W	24	S W	20	---	---	71	56	---	---	---	---
100	St.	70	Cir. St.	80	Cir. Cu.	S W	21	S W	28	W	8	---	---	80	53	3 P.M.	6 P.M.	.53	---
50	Cu	100	Cu. St.	100	Nim.	N W	8	---	0	N E	12	---	---	61	32	7 P.M.	---	---	---
100	Nim.	100	Cu. St.	100	Cu. St.	N	12	N	16	N	12	---	---	41	31	---	10 A. M.	.07	---
100	Cu. St.	100	Cu. St.	100	Cu. St.	N E	16	N E	12	---	0	---	---	46	35	---	---	---	---
20	St.	10	St.	00	---	N W	8	W	8	---	0	---	---	70	35	---	---	---	---
10	St.	40	Cir. St.	90	St.	W	1	S	12	S	12	---	---	75	47	---	---	---	---
30	St.	60	Cu. St.	100	Nim.	S W	8	S	20	---	0	---	---	79	51	7 P.M.	---	---	---
100	Nim.	80	Cu. St.	20	Cir. St.	E	8	N E	4	---	0	---	---	65	41	---	10 A. M.	.55	---
80	Cir. Cu.	90	Cu. St.	10	St.	S W	8	S W	12	---	0	---	---	68	42	---	---	---	---
10	St.	100	Cu. St.	100	Cu. St.	W	6	S W	12	---	0	---	---	67	44	---	---	---	---
00	---	100	Cu. St.	00	---	N	8	W	8	---	0	---	---	73	46	---	---	---	---
60	Cir. Cu.	100	Nim.	100	Cu. St.	S E	4	E	8	---	0	---	---	65	47	12 M.	4 P.M.	.30	---
100	Cu. St.	50	Cu.	---	---	W	8	W	12	---	0	---	---	64	34	---	---	---	---
62	---	71	---	64	---	---	---	---	---	---	---	---	---	---	---	---	---	5.66	---

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				RELATIVE HUMIDITY OR PER CENT OF SATURATION.			PRESSURE OF VAPOR, IN INCHES.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	51	68	53	57½	93	42	42	.348	.290	.170	29.432	29.384	29.374	29.397
2	58	76	67	67	76	49	74	.365	.436	.489	29.329	29.226	29.117	29.224
3	69	76	60	68½	75	64	88	.529	.577	.456	29.082	28.995	29.092	29.056
4	59	76	60	65	94	64	88	.469	.644	.456	29.196	29.236	29.206	29.213
5	65	74	69	69½	84	95	95	.516	.798	.671	29.154	29.027	29.027	29.069
6	72	74	67	71	85	86	74	.668	.718	.489	29.052	28.982	28.965	29.000
7	64	74	60	66	78	55	77	.464	.596	.396	28.948	28.935	28.935	28.939
8	59	77	67	67½	82	57	64	.410	.527	.425	29.013	28.995	28.930	28.979
9	61	68	57	62	94	84	88	.505	.577	.439	28.695	28.698	28.842	28.745
10	57	58	54	56½	94	100	100	.436	.483	.418	28.843	28.815	28.619	28.759
11	56	69	64	63	94	65	78	.420	.462	.464	28.748	28.838	28.808	28.798
12	68	70	62	66½	79	85	88	.543	.621	.491	28.748	28.718	28.785	28.750
13	58	64	51	57½	88	53	93	.423	.314	.348	28.895	29.028	29.118	29.014
14	53	76	57	62	86	56	87	.348	.505	.407	29.282	29.288	29.238	29.269
15	57	76	63	65½	81	52	78	.378	.470	.446	29.359	29.133	29.068	29.187
16	68	81	73	74	84	74	90	.577	.787	.732	29.018	29.035	29.042	29.032
17	63	85	71	73	89	57	100	.510	.691	.759	29.105	29.062	28.945	29.037
18	69	77	65	70½	100	86	78	.703	.799	.483	28.852	28.710	28.802	28.788
19	64	73	60	65½	89	46	77	.529	.396	.396	28.810	28.787	28.818	28.805
20	60	73	58	63½	77	63	88	.396	.510	.423	28.828	28.892	28.920	28.880
21	59	80	65	68	74	55	89	.469	.561	.549	28.950	28.950	28.995	28.965
22	65	80	69	71½	89	48	90	.519	.487	.635	29.082	29.135	29.128	29.115
23	69	82	68	73	85	63	100	.599	.691	.685	29.143	29.072	29.037	29.084
24	69	78	70	72½	90	68	90	.635	.744	.658	28.985	28.977	28.947	28.970
25	66	65	61	64	89	89	94	.570	.549	.505	28.925	28.907	28.887	28.906
26	60	64	62	62	100	94	100	.518	.563	.556	28.858	28.890	28.930	28.893
27	62	69	62	64½	94	85	100	.523	.599	.556	28.990	29.005	29.035	29.010
28	59	60	89	59½	100	100	88	.500	.518	.439	28.980	28.923	28.940	28.948
29	60	69	67	65½	94	80	95	.487	.564	.626	28.928	28.968	28.985	28.960
30	63	71	61	65	83	62	88	.478	.469	.473	29.128	29.161	29.181	29.157
31	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sums	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Means	-----	-----	-----	65° 87	88	69	86	.495	.596	.499	-----	-----	-----	28.998
Average.....					81			.530			-----			

THE MONTH OF JUNE, 1883.

CLOUDS.						WINDS.						OZONE.		REGISTER- ING THER- MOMETER.		RAIN AND SNOW.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.	2 P. M.	9 P. M.	7 A. M. to 2 P. M.		Day: 7 A. M. to 2 P. M. Night: 9 P. M. to 7 A. M.		Maximum.	Minimum.	Beginning, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain and Melt'd Snow.	Depth of Snow In.	
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.								
00	-----	10	St.	10	St.	W	1	S E	8	S E	8	-----	72	43	-----	-----	-----	-----	
10	St.	20	Cu. St.	30	Cir. Cu.	E	8	S	8	S E	8	-----	80	58	-----	-----	-----	-----	
100	Cu. St.	100	Cu. St.	100	St.	S	12	S	16	S W	12	-----	78	56	2:30 P. M.	4 P. M.	.25	-----	
100	Cu. St.	50	Cu.	00	-----	W	8	N	6	-----	0	-----	77	50	-----	-----	-----	-----	
80	Cu. St.	100	Nim.	20	St.	S E	4	W	8	S W	8	-----	80	62	2 P. M.	4 P. M.	.66	-----	
20	St.	100	Nim.	60	Cu. St.	S W	8	S W	4	-----	0	-----	81	56	12 M.	3 P. M.	.76	-----	
10	Cir.	60	Cu.	10	Cir.	S W	4	S W	16	-----	0	-----	77	46	-----	-----	-----	-----	
00	-----	50	Cu.	60	Cu. St.	-----	0	S E	2	S W	4	-----	80	56	4 A. M.	-----	-----	-----	
100	Nim.	100	Nim.	100	Nim.	S E	6	S W	12	N E	1	-----	76	52	-----	-----	-----	-----	
100	Cu. St.	100	Nim.	100	Nim.	N E	1	E	2	N E	8	-----	61	49	-----	12 P. M.	2.50	-----	
70	Cu. St.	50	Cu.	100	Cu. St.	W	12	W	12	W	6	-----	75	54	-----	-----	-----	-----	
90	Cu. St.	100	Cu. St.	20	Cir.	S W	8	S W	12	-----	0	-----	72	52	8 A. M.	4 P. M.	.20	-----	
70	Cu. St.	80	Cu. St.	00	-----	N	12	W	8	-----	0	-----	72	42	-----	-----	-----	-----	
00	-----	10	Cir. St.	10	St.	W	1	S W	6	-----	0	-----	77	47	-----	-----	-----	-----	
00	-----	20	Cir. St.	10	St.	-----	0	S	8	S W	4	-----	86	60	-----	-----	-----	-----	
100	Cu. St.	60	Cu. St.	100	Cu. St.	S W	3	S W	8	-----	0	-----	85	65	2 P. M.	1 P. M.	.05	-----	
90	Cu. St.	50	Cu. St.	100	Nim.	S W	2	S W	3	S E	4	-----	87	67	4 P. M.	-----	-----	-----	
100	Nim.	90	Cu. St.	00	-----	S W	6	W	20	S W	8	-----	81	61	-----	4 P. M.	2.08	-----	
60	Cu. St.	20	Cu.	100	Cu. St.	W	8	W	20	S W	4	-----	73	57	Show	er.	.06	-----	
100	Cu. St.	60	Cu. St.	60	St.	N W	16	N W	8	W	2	-----	76	52	-----	-----	-----	-----	
50	St.	40	Cu.	20	Cir. Cu.	-----	0	S	1	-----	0	-----	80	56	-----	-----	-----	-----	
50	St.	30	Cu.	30	St.	W	2	N W	2	-----	0	-----	83	58	-----	-----	-----	-----	
20	St.	60	Cu. St.	40	St.	W	1	S	2	-----	0	-----	83	65	10 A. M.	12 M.	.18	-----	
100	Cu. St.	70	Cu.	50	St.	S	3	N W	4	-----	0	-----	82	64	1 A. M.	1 P. M.	.21	-----	
100	Cu. St.	100	Nim.	100	Cu. St.	N E	6	N	4	N E	4	-----	66	60	12 M.	4 P. M.	.30	-----	
100	Nim.	100	Cu. St.	100	Nim.	N	3	W	3	-----	0	-----	66	59	5 A. M.	-----	-----	-----	
100	Cu. St.	100	Nim.	100	Nim.	E	1	E	1	N	1	-----	69	59	-----	-----	1.50	-----	
100	Nim.	100	Nim.	100	Cu. St.	S W	4	S W	6	S W	3	-----	61	57	-----	8 A. M.	2.60	-----	
100	Nim.	100	Cu. St.	100	Cu. St.	S	1	S	1	-----	0	-----	73	60	-----	-----	-----	-----	
70	Cir. St.	50	Cu.	00	-----	E	2	E	2	-----	0	-----	73	56	-----	-----	-----	-----	
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
66	-----	66	-----	54	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	11.35	-----	

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				RELATIVE HUMIDITY, OR PER CENT OF SATURATION.			PRESSURE OF VAPOR, IN INCHES.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	65	80	74	73	78	48	76	.483	.487	.641	29.204	29.112	29.012	29.109
2	73	80	77	76½	76	70	61	.617	.717	.564	28.995	28.997	29.042	29.011
3	74	83	73	76½	90	71	85	.758	.802	.693	29.110	29.026	29.020	29.052
4	75	76	73	74½	90	82	90	.758	.731	.732	28.974	29.029	29.075	29.025
5	73	83	72	76	85	71	85	.693	.802	.668	29.122	29.124	29.130	29.125
6	72	85	72	76½	95	61	85	.745	.733	.668	29.153	29.089	29.025	29.089
7	76	63	59	66	86	94	82	.772	.543	.416	28.877	28.925	29.062	28.955
8	59	68	56	61	70	56	81	.352	.380	.363	29.100	29.156	29.156	29.137
9	54	69	57	60	87	52	81	.362	.367	.378	29.132	29.108	29.140	29.127
10	60	79	72	70½	82	66	76	.426	.651	.595	29.083	29.114	28.985	29.061
11	69	84	69	74	85	61	85	.599	.704	.599	29.015	28.952	28.910	28.959
12	71	76	66	71	85	73	89	.644	.652	.570	28.737	28.725	28.785	28.749
13	59	74	64	65½	94	76	94	.469	.641	.563	28.898	28.927	28.910	28.912
14	64	78	66	69½	94	73	100	.563	.704	.639	28.942	28.897	28.892	28.910
15	64	79	63	68½	94	62	83	.563	.612	.478	28.837	28.882	28.967	28.895
16	63	84	68	71½	83	64	100	.478	.746	.685	28.972	28.869	28.805	28.882
17	64	71	65	66½	78	53	73	.469	.403	.451	28.898	29.052	29.179	29.043
18	59	70	60	63	82	53	77	.410	.385	.396	29.304	29.326	29.298	29.306
19	58	72	61	63½	88	54	88	.423	.422	.473	29.326	29.291	29.246	29.288
20	62	64	62	62½	83	89	88	.460	.529	.491	29.229	29.154	29.120	29.168
21	65	81	75	73½	94	78	72	.583	.800	.628	29.108	29.114	29.145	29.122
22	69	85	76	76½	100	72	91	.708	.863	.812	29.190	29.169	29.150	29.170
23	69	71	65	68½	95	95	94	.671	.720	.583	29.158	29.077	29.062	29.099
24	59	72	61	64	100	71	100	.500	.559	.537	28.992	29.027	29.062	29.027
25	62	75	66	67½	94	86	95	.523	.771	.604	29.115	29.117	29.102	29.111
26	63	78	70	70½	100	78	85	.576	.744	.621	29.138	29.152	29.105	29.132
27	70	79	66	71½	90	78	89	.658	.772	.570	29.145	29.138	29.133	29.139
28	62	74	56	64	83	47	87	.460	.396	.391	29.138	29.115	29.156	29.136
29	61	71	57	63	71	49	81	.383	.371	.378	29.211	29.183	29.191	29.195
30	57	74	61	64	87	55	71	.407	.463	.383	29.179	29.161	29.158	29.166
31	62	77	61	66½	77	53	88	.429	.492	.473	29.156	29.127	29.122	29.135
Sums.	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Means	-----	-----	-----	68° 34'	87	67	85	.546	.611	.550	-----	-----	-----	29.072
Average	-----	-----	-----	-----	80	-----	-----	.569	-----	-----	-----	-----	-----	-----

THE MONTH OF JULY, 1883.

CLOUDS.						WINDS.						OZONE.		REGISTER- ING THER- MOMETER.	RAIN AND SNOW.				
7 A. M.		2 P. M.		9 P. M.		7 A. M.	2 P. M.	9 P. M.	Day: 7 A. M. to 2 P. M.		Night: 9 P. M. to 7 A. M.		Maximum.	Minimum.	Beginning Rain or Snow.	Ending Rain or Snow.	Inches of Rain or Melt'd Snow.	Depth of Snow.	In.
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Day: 7 A. M. to 2 P. M.	Night: 9 P. M. to 7 A. M.	Maximum.	Minimum.	Beginning Rain or Snow.	Ending Rain or Snow.	Inches of Rain or Melt'd Snow.	Depth of Snow.
00	-----	60	Cir. Cu.	00	-----	s w	4	s w	12	s w	8	-----	-----	80	65	-----	-----	-----	-----
20	St.	90	Cu. St.	80	Cir. St.	w	12	s	8	-----	0	-----	-----	85	67	Show	er.	.05	---
90	Cu. St.	100	Cu. St.	100	Cu. St.	w	4	s	4	-----	0	-----	-----	90	71	4 P. M.	5 P. M.	.07	---
90	St.	100	Nim.	00	-----	s w	6	N	16	s E	1	-----	-----	85	67	2 P. M.	3 P. M.	.18	---
50	Cir. Cu.	100	Cu. St.	00	-----	s w	4	s w	8	-----	0	-----	-----	84	64	Show	er.	.02	---
90	St.	30	Cu.	10	St.	w	2	s w	8	s w	8	-----	-----	86	71	-----	-----	-----	---
80	St.	100	Nim.	60	St.	s w	12	N	6	E	1	-----	-----	76	53	8 A. M.	6 P. M.	.22	---
00	-----	40	Cu.	60	-----	E	6	N	8	-----	0	-----	-----	68	45	-----	-----	-----	---
20	Cir.	20	Cir. St.	00	-----	E	1	s w	2	-----	0	-----	-----	73	48	-----	-----	-----	---
10	Cu.	60	Cu.	100	Cu. St.	s w	8	w	12	N w	4	-----	-----	80	60	-----	-----	-----	---
10	St.	60	Cu. St.	00	-----	w	1	s w	6	-----	0	-----	-----	85	66	-----	-----	-----	---
100	Cu. St.	90	Cu. St.	40	St.	s w	12	s w	16	-----	0	-----	-----	77	57	8 A. M.	1 P. M.	.24	---
100	St.	90	Cu. St.	30	St.	-----	0	N w	4	E	1	-----	-----	76	60	In	nlight.	.08	---
100	Nim.	50	Cu.	100	Nim.	s	6	s	8	s w	12	-----	-----	83	64	9 P. M.	-----	-----	---
100	Cu. St.	30	Cu.	10	St.	s w	4	w	8	-----	0	-----	-----	79	56	-----	5 A. M.	2.15	---
90	Cu. St.	80	Cu. St.	100	Nim.	s	1	s w	16	s w	4	-----	-----	86	62	7:30 P. M.	12 P. M.	.33	---
30	St.	60	Cu.	70	Cu. St.	s w	8	w	12	w	6	-----	-----	71	53	-----	-----	-----	---
00	-----	80	Cu. St.	20	Cu. St.	N w	8	w	16	-----	0	-----	-----	70	50	-----	-----	-----	---
70	St.	30	Cu.	20	St.	w	1	w	4	-----	0	-----	-----	74	52	-----	-----	-----	---
100	St.	100	Nim.	80	Cir. St.	s E	8	s E	12	-----	0	-----	-----	69	62	12 M.	3 P. M.	.15	---
100	Nim.	70	Cu. St.	100	Nim.	E	2	s w	8	s w	8	-----	-----	82	64	4 A. M.	-----	1.60	---
100	Nim.	60	Cu. St.	100	Cu. St.	s	2	s w	8	-----	0	-----	-----	86	67	-----	-----	3.50	---
100	Nim.	100	Nim.	100	Cu. St.	s w	1	E	4	E	1	-----	-----	75	57	-----	-----	1.18	---
100	Nim.	60	Cu.	20	St.	N	4	E	4	-----	0	-----	-----	74	57	-----	-----	1.18	---
70	Cu. St.	90	Cu. St.	20	Cu.	-----	0	w	1	-----	0	-----	-----	78	57	3 P. M.	7 P. M.	.31	---
20	St.	90	Cu. St.	20	Cu.	-----	0	s	3	s w	8	-----	-----	79	64	-----	-----	-----	---
90	Cir. Cu.	100	Cu. St.	00	-----	s w	8	s w	6	-----	0	-----	-----	79	58	Show	er.	.01	---
00	-----	20	Cir. Cu.	00	-----	w	8	N w	12	-----	0	-----	-----	75	52	-----	-----	-----	---
00	-----	50	Cir. St.	00	-----	w	1	w	4	N w	1	-----	-----	71	48	-----	-----	-----	---
10	St.	50	Cu.	00	-----	w	2	s w	3	-----	0	-----	-----	74	54	-----	-----	-----	---
00	-----	40	Cu.	00	-----	w	1	w	4	-----	0	-----	-----	77	54	-----	-----	-----	---
56	-----	68	-----	38	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	11.27	---

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				RELATIVE HUMIDITY, OR PER CENT OF SATURATION.			PRESSURE OF VAPOR, IN INCHES.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	9 P. M.	9 P. M.	Daily Mean.	7 A. M.	9 P. M.	9 P. M.	7 A. M.	9 P. M.	9 P. M.	7 A. M.	9 P. M.	9 P. M.	Mean.
1	65	78	69	70 $\frac{1}{2}$	84	57	75	.516	.550	.529	29.100	29.057	28.962	29.040
2	66	75	56	65 $\frac{1}{2}$	95	56	75	.604	.484	.336	28.922	28.947	29.635	28.968
3	54	66	55	58 $\frac{1}{2}$	87	59	87	.362	.376	.376	29.091	29.098	29.143	29.111
4	55	66	58	59 $\frac{1}{2}$	92	64	82	.405	.407	.394	29.199	29.224	29.216	29.213
5	58	71	57	62	88	49	94	.423	.371	.436	29.299	29.286	29.296	29.294
6	55	71	55	60 $\frac{1}{2}$	81	41	87	.349	.309	.376	29.352	29.351	29.338	29.347
7	54	74	58	62	93	61	88	.375	.429	.423	29.369	29.303	29.296	29.322
8	58	74	58	63 $\frac{1}{2}$	88	47	88	.423	.396	.423	29.301	29.255	29.241	29.266
9	58	75	62	65	88	48	77	.423	.415	.429	29.216	29.205	29.201	29.207
10	56	78	63	65 $\frac{1}{2}$	87	46	89	.391	.443	.510	29.206	29.183	29.165	29.185
11	59	80	62	67	94	51	94	.469	.523	.523	29.171	29.120	29.087	29.126
12	70	72	66	69 $\frac{1}{2}$	75	80	89	.551	.631	.570	28.992	28.985	29.037	29.005
13	58	65	48	57	94	68	100	.452	.420	.335	29.146	29.216	29.294	29.219
14	50	68	53	57	93	56	98	.335	.380	.375	29.322	29.318	29.316	29.319
15	57	72	62	63 $\frac{1}{2}$	87	58	77	.407	.455	.429	29.284	29.191	29.151	29.209
16	56	77	61	64 $\frac{1}{2}$	94	57	82	.420	.527	.442	29.131	29.102	29.082	29.105
17	64	83	69	72	89	64	85	.529	.771	.599	29.100	29.057	29.055	29.071
18	73	79	71	74 $\frac{1}{2}$	85	74	85	.693	.731	.644	29.065	29.014	29.032	29.037
19	74	86	76	78 $\frac{1}{2}$	90	61	86	.758	.762	.772	29.002	28.979	28.922	28.968
20	70	78	62	70	80	36	67	.586	.342	.370	28.930	28.950	28.972	28.951
21	63	80	71	71 $\frac{1}{2}$	78	37	66	.446	.382	.503	29.070	29.072	29.105	29.082
22	74	91	71	78 $\frac{1}{2}$	86	48	62	.718	.694	.469	28.940	28.881	28.992	28.938
23	58	72	55	61 $\frac{1}{2}$	88	48	58	.423	.327	.295	29.132	29.117	29.168	29.139
24	51	73	54	59 $\frac{1}{2}$	86	39	87	.321	.313	.362	29.212	29.205	29.181	29.199
25	49	77	62	62 $\frac{1}{2}$	93	38	72	.322	.356	.399	29.212	29.165	29.141	29.173
26	62	67	53	60 $\frac{1}{2}$	77	50	61	.429	.333	.244	29.286	29.316	29.358	29.320
27	50	72	61	61	93	68	77	.335	.455	.413	29.314	29.048	29.103	29.155
28	54	68	58	60	93	95	64	.390	.648	.309	29.055	29.075	29.103	29.078
29	52	72	55	59 $\frac{1}{2}$	86	46	81	.334	.358	.349	29.212	29.211	29.211	29.211
30	54	76	60	63 $\frac{1}{2}$	87	45	88	.362	.402	.456	29.224	29.205	29.216	29.215
31	59	78	65	67 $\frac{1}{2}$	88	54	78	.439	.514	.483	29.298	29.310	29.291	29.300
Sums.	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Means	-----	-----	-----	64 $\frac{1}{2}$.90	88	55	80	.451	.467	.438	-----	-----	-----	29.154
Average.....					74			.452			-----			

THE MONTH OF AUGUST, 1883.

CLOUDS.						WINDS.						OZONE.		REGISTER- ING THER- MOMETER.		RAIN AND SNOW.				
7 A. M.		2 P. M.		9 P. M.		7 A. M.	2 P. M.	9 P. M.			Day: 7 A. M. to 2 P. M. Night: 9 P. M. to 7 A. M.		Maximum.	Minimum.	Beginning, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain or Melt'd Snow.	Depth of Snow, In.		
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.									
10	St.	60	Cu. St.	30	Cir. Cu.	s w	6	s w	8	0	0	80	58							
10	St.	40	Cu.	00		s w	6	w	8	0	0	75	47							
00		50	Cu.	20	St.	w	4	n w	8	0	0	71	46							
90	St.	100	St.	20	St.	w	3	w	3	0	0	68	46							
5	St.	20	Cu.	00		w	3	n w	4	0	0	73	46							
00		00		00		n w	1	n w	1	0	0	72	45							
10	St.	10	Cu.	00			0		0	0	0	75	47							
00		10	Cu.	00			0	E	1	0	0	75	47							
00		10	St.	00		E	1	E	1	0	0	76	53							
00		30	Cu.	00			0	E	2	0	0	78	52							
10	St.	80	Cu. St.	50	St.		0	s	1	0	0	80	58							
60	St.	100	Nim.	80	Cu. St.	w	4	s w	4	n w	2	82	56	1 P. M.						
100	Nim.	90	Cu. St.	20	St.	n	1	n	1	0	0	66	43		8 A. M.	.08				
90	St.	40	Cu.	50	St.	n E	1	E	2	E	1	68	45							
50	Cir. Cu.	50	Cu.	00		E	1	n E	1	0	0	73	46							
00		20	Cu.	10	St.	E	1	s w	1	0	0	77	46							
00		70	Cu. St.	100	St.		0	s w	6	s w	1	84	64							
100	St.	90	Cu. St.	40	St.	s w	s	s w	6		0	81	65							
80	St.	60	Cu. St.	60	St.	s w	3	s w	s	s	7	87	69	In	night.	.02				
80	St.	10	Cu.	00		w	s	s w	s	s w	3	78	55							
00		90	Cu. St.	60	St.	s w	4	s w	s	s	s	84	62							
00		50	Cu.	50	St.	s w	s	s w	12	s w	4	91	51	Show	er.	.03				
30	Cir.	00		00		w	4	w	s		0	72	42							
00		10	Cu.	00			0	w	4		0	71	43							
00		10	Cu.	00		w	2	w	s		0	77	48							
80	Cu. St.	60	Cu.	00		E	4	n E	4		0	69	32							
00		60	Cu.	100	St.	n E	2	s E	s		0	77	56							
100	Nim.	60	Cu.	00		s E	1	n	2		0	72	45	4 A. M.	7 A. M.	.95				
10	St.	30	Cu.	00		n	1	n	4		0	72	45							
00		40	Cu.	50	St.	w	2	w	3		0	77	52							
90	St.	50	Cu.	30	St.	w	1	s w	4		0	81	56							
32		45		25													.18			

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				RELATIVE HUMID- ITY, OR PER CENT OF SATURATION.			PRESSURE OF VAPOR, IN INCHES.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	63	80	69	70 $\frac{1}{2}$	83	48	70	.478	.487	.496	29.286	29.207	29.148	29.214
2	63	69	60	65 $\frac{1}{2}$	71	75	77	.509	.529	.396	29.047	29.077	29.191	29.105
3	46	67	49	54	84	60	85	.262	.393	.297	29.309	29.271	29.249	29.276
4	54	72	56	60 $\frac{1}{2}$	71	58	75	.308	.455	.336	29.073	28.992	29.090	29.052
5	45	61	50	53	92	43	79	.275	.257	.283	29.307	29.339	29.326	29.324
6	44	72	53	58	92	85	82	.265	.608	.394	29.285	29.191	29.120	29.199
7	55	68	50	57 $\frac{1}{2}$	93	70	86	.405	.476	.309	29.041	28.928	29.028	28.999
8	42	52	43	45 $\frac{1}{2}$	83	60	67	.222	.232	.186	29.237	29.314	29.423	29.325
9	34	56	39	43	79	40	100	.155	.179	.238	29.557	29.531	29.496	29.528
10	39	62	47	49 $\frac{1}{2}$	100	36	77	.238	.334	.249	29.517	29.456	29.414	29.472
11	40	69	53	54	100	39	86	.248	.277	.348	29.407	29.353	29.336	29.365
12	43	74	57	58	100	72	60	.278	.604	.322	29.309	29.216	29.181	29.245
13	42	77	63	69 $\frac{1}{2}$	91	49	83	.244	.457	.478	29.169	29.132	29.141	29.147
14	60	80	67	69	94	55	79	.487	.561	.522	29.216	29.218	29.233	29.222
15	59	85	73	72 $\frac{1}{2}$	94	44	63	.469	.531	.518	29.265	29.179	29.122	29.155
16	65	71	53	63	94	80	80	.583	.608	.321	28.985	28.945	28.992	28.974
17	46	65	50	53 $\frac{1}{2}$	92	49	79	.286	.301	.283	29.154	29.174	29.273	29.200
18	44	68	57	56 $\frac{1}{2}$	92	42	69	.265	.290	.322	29.332	29.296	29.293	29.307
19	42	71	61	58	91	62	82	.244	.469	.442	29.312	29.281	29.361	29.318
20	57	67	65	63	94	79	73	.436	.522	.451	29.206	29.112	28.998	29.105
21	63	60	57	60	94	94	94	.543	.487	.436	28.900	28.973	29.052	28.975
22	58	67	61	62	100	89	88	.483	.591	.473	29.098	29.122	29.153	29.124
23	60	65	59	61 $\frac{1}{2}$	100	100	100	.518	.618	.500	29.122	29.020	28.907	29.016
24	57	61	55	57 $\frac{1}{2}$	100	50	62	.436	.269	.269	28.758	28.655	28.648	28.687
25	48	57	44	49 $\frac{1}{2}$	78	41	81	.260	.191	.241	28.905	28.988	29.140	29.011
26	32	58	49	46 $\frac{1}{2}$	100	48	71	.181	.229	.247	29.192	29.153	29.105	29.150
27	48	68	52	56	78	56	86	.260	.380	.334	29.018	28.913	29.078	29.003
28	38	42	40	40	100	91	100	.229	.244	.248	29.216	29.224	29.204	29.215
29	43	58	46	49	100	70	84	.278	.337	.262	29.167	29.033	29.038	29.086
30	38	52	46	45 $\frac{1}{2}$	91	60	77	.208	.232	.238	29.088	29.045	29.065	29.066
31	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sums.	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Means	-----	-----	-----	56 $^{\circ}$.43	91	62	80	.335	.407	.337	-----	-----	-----	29.162
Average -----					78			.360			-----			

THE MONTH OF SEPTEMBER, 1883.

CLOUDS.						WINDS.						OZONE.		REGISTER- ING THER- MOMETER.		RAIN AND SNOW.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.	2 P. M.	9 P. M.	7 A. M. to 2 P. M.	2 P. M. to 9 P. M.	9 P. M. to 7 A. M.	Day: 7 A. M. to 2 P. M.	Night: 9 P. M. to 7 A. M.	Maximum.	Minimum.	Beginning, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain or Melt'd Snow.	Depth of Snow.
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.								
90	St.	30	Cir. St.	100	Cu. St.	s w	4	s w	8	s w	4	---	---	80	63	---	---	---	---
100	St.	100	St.	10	St.	w	3	n	6	n	4	---	---	78	42	---	---	---	---
00	---	10	St.	00	---	n w	4	n w	1	---	0	---	---	67	43	9 A. M.	10 A. M.	.06	---
70	Cu. St.	40	Cu.	00	---	s w	8	s w	8	---	0	---	---	72	39	---	---	---	---
00	---	60	Cu.	00	---	n w	3	n w	3	---	0	---	---	67	38	---	---	---	---
00	---	00	---	00	---	---	0	w	2	---	0	---	---	73	43	---	---	---	---
100	Nim.	100	Cu. St.	100	Nim.	s	3	s w	6	n w	1	---	---	70	39	4 A. M.	10 P. M.	.12	---
50	Cu. St.	60	Cu.	00	---	n	1	n	1	n	3	---	---	56	28	---	---	---	---
00	---	30	Cu.	00	---	n	1	n	1	---	0	---	---	57	31	---	---	---	---
00	---	10	St.	00	---	e	1	e	3	---	0	---	---	63	34	---	---	---	---
100	Fog.	00	---	00	---	e	1	e	1	---	0	---	---	70	38	---	---	---	---
00	---	30	Cir. St.	20	Cir. St.	---	0	n e	2	---	0	---	---	74	37	---	---	---	---
80	St.	100	Cu. St.	00	---	---	0	e	1	---	0	---	---	77	41	---	---	---	---
100	Fog.	60	Cu. St.	30	St.	---	0	s w	3	---	0	---	---	83	56	---	---	---	---
10	Cir.	30	Cu. St.	40	St.	s	2	s w	8	s e	6	---	---	86	58	---	---	---	---
100	Cu. St.	100	Cu. St.	100	Cu. St.	w	2	w	3	n	3	---	---	77	42	Show	ers.	.18	---
00	---	20	Cu.	00	---	n	1	n	1	---	0	---	---	65	38	---	---	---	---
00	---	00	---	00	---	n e	3	e	1	---	0	---	---	68	40	---	---	---	---
60	Cir. Cu.	60	Cu. St.	100	Cu. St.	e	1	e	5	e	1	---	---	72	42	Show	er.	.06	---
100	Cu. St.	100	St.	70	Cu. St.	e	1	e	1	---	0	---	---	67	57	---	---	---	---
100	St.	100	Nim.	100	St.	e	4	w	6	---	0	---	---	63	55	Show	er.	.10	---
100	Fog.	90	Cu. St.	100	Cu. St.	n e	1	s w	2	---	0	---	---	67	56	1 A. M.	---	1.30	---
100	Nim.	100	Nim.	100	Cu. St.	e	1	---	0	s w	3	---	---	69	54	---	5 P. M.	.45	---
70	Nim.	100	Cu. St.	100	St.	s w	6	w	12	w	12	---	---	63	48	---	---	---	---
100	Cu. St.	90	Cir. Cu.	00	---	n w	8	n w	8	---	0	---	---	57	30	---	---	---	---
00	---	20	Cu.	00	---	s	8	s w	8	n w	8	---	---	60	32	---	---	---	---
70	Cir. St.	20	St.	100	Cu. St.	s	6	w	12	n e	4	---	---	70	37	---	---	---	---
100	Cu. St.	100	Nim.	100	St.	---	0	n e	2	---	0	---	---	47	38	11 A. M.	4 P. M.	.05	---
100	St.	100	Cu. St.	100	Cu. St.	n e	1	e	8	n e	2	---	---	61	34	Show	er.	.02	---
100	St.	20	Cu.	00	---	n e	2	e	2	---	0	---	---	53	28	---	---	---	---
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2.34	---
60	---	56	---	42	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				RELATIVE HUMID- ITY OR PER CENT OF SATURATION.			PRESSURE OF VAPOR IN INCHES.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	35	55	44	44 $\frac{1}{2}$	100	62	92	.204	.269	.265	29.059	28.938	28.830	28.942
2	42	56	40	46	100	51	82	.267	.230	.203	28.741	28.861	28.980	28.861
3	34	51	37	40 $\frac{1}{2}$	100	34	63	.196	.126	.136	29.169	29.271	29.406	29.282
4	36	52	38	42	90	41	81	.191	.159	.186	29.460	29.397	29.341	29.399
5	40	56	47	47 $\frac{1}{2}$	91	57	77	.225	.255	.249	29.330	29.306	29.269	29.302
6	45	49	47	47	92	100	85	.275	.322	.298	29.197	29.228	29.291	29.239
7	46	57	44	49	92	63	92	.286	.295	.265	29.389	29.358	29.326	29.358
8	49	66	62	59	93	64	22	.322	.407	.125	29.242	29.121	29.067	29.143
9	65	75	67	69	84	68	79	.516	.591	.522	29.008	28.990	29.085	29.028
10	52	56	47	51 $\frac{1}{2}$	100	87	100	.388	.391	.323	29.062	29.191	29.276	29.176
11	47	62	54	54 $\frac{1}{2}$	100	72	93	.323	.399	.390	29.334	29.251	29.198	29.261
12	53	63	55	57	100	83	100	.403	.478	.418	29.075	29.092	29.154	29.107
13	45	44	45	44 $\frac{1}{2}$	100	100	100	.300	.289	.300	29.192	29.042	28.978	29.071
14	38	43	38	39 $\frac{1}{2}$	100	75	100	.229	.203	.229	29.242	29.331	29.466	29.346
15	30	46	38	38	89	47	72	.148	.146	.165	29.627	29.647	29.684	29.653
16	29	48	36	37 $\frac{1}{2}$	78	36	61	.123	.120	.129	29.701	29.640	29.664	29.651
17	32	54	48	44 $\frac{1}{2}$	89	55	78	.162	.231	.260	29.522	29.348	29.256	29.375
18	57	60	57	58	81	88	100	.378	.456	.466	29.043	29.023	29.068	29.046
19	56	67	44	55 $\frac{1}{2}$	100	55	68	.449	.362	.196	29.108	29.068	29.244	29.150
20	32	36	33	33 $\frac{1}{2}$	79	61	70	.143	.129	.131	29.510	29.541	29.556	29.536
21	35	41	33	36 $\frac{1}{2}$	70	57	89	.142	.147	.168	29.492	29.404	29.378	29.425
22	33	39	36	36	79	55	71	.156	.131	.149	29.390	29.376	29.391	29.386
23	36	42	38	38 $\frac{1}{2}$	80	50	72	.170	.134	.165	29.425	29.426	29.415	29.422
24	36	48	41	41 $\frac{1}{2}$	80	63	74	.170	.212	.190	29.376	29.296	29.281	29.318
25	40	44	40	41 $\frac{1}{2}$	100	92	100	.235	.265	.248	29.086	29.000	28.988	29.025
26	36	51	43	43 $\frac{1}{2}$	100	53	75	.212	.196	.203	29.168	29.135	29.173	29.139
27	40	51	42	44 $\frac{1}{2}$	82	59	83	.203	.221	.222	29.169	29.123	29.122	29.138
28	46	52	56	51 $\frac{1}{2}$	92	93	100	.286	.361	.449	28.993	28.731	28.685	28.803
29	54	57	47	52 $\frac{1}{2}$	100	81	92	.418	.378	.298	28.510	28.402	28.629	28.514
30	42	54	46	47 $\frac{1}{2}$	91	43	62	.244	.181	.192	28.708	28.821	28.911	28.813
31	38	42	35	38 $\frac{1}{2}$	72	66	61	.165	.177	.127	28.941	28.988	29.058	28.996
Sums.	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Means.	-----	-----	-----	46°.17	90	65	80	.256	.266	.247	-----	-----	-----	29.158
Average.....					78			.256			-----			

THE MONTH OF OCTOBER, -1883.

CLOUDS.						WINDS.						OZONE.		REGISTER- ING THER- MOMETER.		RAIN AND SNOW.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.		Day: 7 A. M. to 2 P. M.	Night: 9 P. M. to 7 A. M.	Maximum.	Minimum.	Beginning, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain or Melted Snow.	Depth of Snow, In.
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.								
20	Cu.	70	Cu. St.	00	-----	s	1	s	1	---	0	---	---	60	34	---	---	---	---
100	Nim.	10	Cu.	00	-----	N	4	s W	6	---	0	---	---	56	28	12 M.	8 A. M.	.47	---
00	-----	10	Cu.	00	-----	s W	1	N W	2	---	0	---	---	51	24	---	---	---	---
10	St.	100	Cu. St.	30	St.	---	0	W	---	---	0	---	---	53	33	---	---	---	---
50	Cu. St.	90	Cu. St.	100	Cu. St.	s W	1	E	13	s	16	---	---	57	37	---	---	---	---
100	Nim.	100	Cu. St.	100	St.	E	7	N E	---	---	0	---	---	49	37	12 M.	8 A. M.	.15	---
90	St.	100	St.	100	St.	---	0	N W	7	---	0	---	---	57	35	---	---	---	---
80	Cu. St.	40	Cu. St.	00	-----	s E	5	s	12	---	0	---	---	67	47	---	---	---	---
10	Cir.	100	Nim.	100	Cu. St.	s W	12	s W	8	---	0	---	---	77	51	---	---	---	---
100	Nim.	100	Cu. St.	30	St.	N	1	N	3	---	0	---	---	60	38	3 A. M.	9 A. M.	.73	---
100	St.	90	St.	100	Nim.	E	2	E	2	E	1	---	---	62	45	9 P. M.	---	---	---
100	Nim.	100	St.	100	St.	s E	1	s W	4	W	2	---	---	63	45	---	8 A. M.	.28	---
100	Nim.	100	Nim.	100	Nim.	N E	4	E	4	E	6	---	---	46	35	2 A. M.	10 P. M.	.43	---
100	St.	100	St.	100	Cu. St.	N	4	N W	4	N E	3	---	---	43	25	---	---	---	---
10	St.	70	Cu. St.	00	-----	N	2	E	2	E	1	---	---	48	22	---	---	---	---
00	-----	00	-----	00	-----	E	2	E	2	E	1	---	---	48	25	---	---	---	---
70	St.	50	Cu. St.	30	Cir. St.	E	3	s E	8	s E	6	---	---	57	32	---	---	---	---
100	Cu. St.	100	Nim.	100	Nim.	s	12	s	12	s E	12	---	---	60	35	8 A. M.	---	---	---
100	Nim.	50	Cu.	00	-----	s W	1	W	8	N	4	---	---	67	30	---	8 A. M.	.55	---
100	St.	100	St.	100	St.	N E	6	N E	4	N	3	---	---	37	30	---	---	---	---
100	St.	100	St.	100	St.	E	3	E	4	E	2	---	---	41	30	---	---	---	---
100	St.	70	Cu.	00	-----	E	2	N	2	---	0	---	---	42	30	---	---	---	---
100	St.	100	St.	100	St.	N E	4	N E	4	N E	2	---	---	42	34	---	---	---	---
90	St.	100	St.	100	St.	N	4	E	3	---	0	---	---	48	34	---	---	---	---
100	St.	100	Nim.	100	Nim.	E	1	N E	1	N E	1	---	---	44	34	11 A. M.	11 P. M.	.30	---
00	-----	60	Cu.	100	St.	N	2	N	2	---	0	---	---	52	25	---	---	---	---
90	St.	100	St.	00	-----	E	1	E	1	---	0	---	---	52	34	---	---	---	---
100	Nim.	100	Nim.	100	Nim.	s E	4	s E	6	s	1	---	---	56	45	7 A. M.	---	---	---
100	Nim.	70	Cu.	100	Cu. St.	---	0	W	2	W	4	---	---	57	42	---	3 A. M.	.75	---
00	-----	80	Cu. St.	60	St.	s W	8	W	3	W	1	---	---	55	35	---	---	---	---
00	-----	100	Cu. St.	100	Cu. St.	W	6	W	15	W	12	---	---	44	20	---	---	---	---
63	-----	79	-----	63	-----	---	---	---	---	---	---	---	---	---	---	---	---	---	3.66

STATE BOARD OF AGRICULTURE.

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				RELATIVE HUMIDITY OR PER CENT OF SATURATION.			PRESSURE OF VAPOR, IN INCHES.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	34	41	36	37	70	57	80	.138	.147	.170	29.163	29.224	29.294	29.227
2	33	44	30	35½	79	52	100	.150	.151	.167	29.317	29.301	29.244	29.287
3	39	50	46	45	64	52	77	.152	.186	.238	29.096	28.948	29.021	29.022
4	33	55	47	45	100	50	92	.188	.218	.298	29.156	29.143	29.143	29.147
5	53	54	55	54	54	93	100	.219	.390	.433	29.018	28.953	28.825	28.932
6	45	44	35	41½	84	68	80	.251	.196	.162	28.955	29.151	29.284	29.130
7	25	44	41	36½	100	68	74	.135	.196	.190	29.297	29.167	29.046	29.170
8	37	58	44	46½	90	64	92	.199	.309	.265	28.998	28.912	28.900	28.937
9	49	55	44	49½	100	74	100	.348	.321	.289	28.542	28.742	28.965	28.750
10	32	52	37	40½	100	66	71	.181	.257	.157	28.933	28.900	29.055	28.963
11	30	52	30	37½	100	47	78	.167	.183	.130	29.073	28.837	29.070	28.993
12	23	29	30	27½	86	78	78	.106	.123	.130	29.319	29.349	29.292	29.320
13	30	43	30	34½	89	59	78	.148	.164	.130	28.842	28.731	28.913	28.829
14	22	22	19	20½	85	72	100	.091	.084	.103	29.129	29.213	29.182	29.175
15	19	21	15	18½	100	100	100	.103	.113	.086	28.998	29.105	29.324	29.142
16	15	21	20	18½	100	86	100	.086	.096	.108	29.598	29.486	29.370	29.485
17	23	39	33	31½	60	38	70	.073	.090	.131	29.300	29.207	29.204	29.237
18	39	43	42	41½	46	43	50	.110	.121	.134	29.227	29.192	29.182	29.200
19	35	56	43	44½	70	46	59	.142	.204	.164	29.224	29.188	29.202	29.205
20	46	55	56	52½	77	93	100	.238	.405	.449	29.053	28.948	28.938	28.980
21	54	63	57	57½	93	78	94	.390	.446	.436	28.935	28.855	28.637	28.809
22	42	47	34	41	83	70	90	.222	.225	.175	29.085	29.128	29.166	29.126
23	31	45	43	39½	100	84	100	.174	.251	.278	29.167	29.091	29.051	29.103
24	43	45	35	41	75	61	80	.209	.182	.162	29.118	29.313	29.342	29.258
25	36	50	52	46	90	72	86	.191	.258	.334	29.257	29.024	28.955	29.079
26	50	37	28	38½	100	63	88	.361	.136	.135	28.751	29.075	29.286	29.037
27	17	33	29	26½	100	89	100	.094	.168	.160	29.681	29.469	29.359	29.503
28	27	34	26	29	100	70	100	.147	.138	.141	29.438	29.581	29.586	29.535
29	24	42	39	36½	89	66	64	.142	.164	.152	29.390	29.128	28.973	29.164
30	32	29	29	30	100	89	89	.188	.142	.142	29.006	29.141	29.168	29.105
31	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sums	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Means	-----	-----	-----	38°.08	86	68	86	.178	.202	.201	-----	-----	-----	29.128
Average	-----				80			.194			-----			

THE MONTH OF NOVEMBER, 1883.

CLOUDS.						WINDS.						OZONE.		REGISTER- ING THER- MOMETER.		RAIN AND SNOW.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.	2 P. M.	9 P. M.	7 A. M. to 2 P. M.		9 P. M. to 7 A. M.		Maximum.	Minimum.	Beginning, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain and Melt'd Snow.	Depth of Snow, in.	
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.								
80	Cu. St.	100	Cu. St.	100	St.	N	9	W	10	W	8		41	31					
90	St.	40	Cu.	00	-----	W	1	W	12	---	0		45	29					
90	St.	90	St.	50	St.	S W	12	W	20	W	3		50	31					
100	Fog.	10	St.	00	-----	---	0	S W	12	N W	8		55	33					
100	Cu. St.	100	Nim.	100	Nim.	S	12	S	12	S W	16		61	43	11 A. M.	11 P. M.	1.30		
90	Cu. St.	100	Cu. St.	00	-----	N W	12	W	8	N W	1		46	23					
40	St.	100	Cu. St.	60	Cu. St.	---	0	S	8	S	12		44	25					
40	St.	60	Cu. St.	20	St.	---	0	S	8	---	0		60	36					
100	Nim.	50	Cu.	100	St.	N E	1	W	8	---	0		55	30	5 A. M.	11 A. M.	.21		
90	St.	50	Cu.	00	-----	W	1	W	12	W	8		53	26					
00	-----	50	Cu. St.	60	Cir. Cu.	S W	6	S W	28	N W	16		52	22					
30	Cu.	60	Cir. Cu.	100	Cu. St.	W	24	N W	20	---	0		30	23					
10	Cir.	100	Cu. St.	100	Cu. St.	S W	20	W	24	W	8		44	17					
00	-----	100	Cu. St.	90	Cu. St.	N W	12	N W	12	N W	12		23	12					
100	Nim.	90	Cu. St.	00	-----	S W	16	W	28	W	12		23	7					
90	Cir. Cu.	10	Cir.	00	-----	---	0	S W	16	S	12		23	7					
10	St.	10	Cir. St.	10	St.	S W	16	S W	16	S W	12		39	23					
100	St.	100	St.	100	St.	S W	12	S W	12	S W	8		43	32					
10	St.	20	Cir. St.	10	St.	S	8	S W	12	S	8		56	35					
100	Nim.	100	Cu. St.	100	Cu. St.	S	12	S W	12	S E	8		58	46	7 A. M.		1.21		
100	Nim.	100	Cu. St.	100	Nim.	S	12	S	8	S	12		63	40	12 M.		.50		
100	Cu. St.	80	Cu. St.	00	-----	W	12	W	4	---	0		47	30					
50	St.	100	Cu. St.	100	St.	---	0	S E	6	---	0		45	31					
100	St.	30	Cu.	00	-----	W	12	N W	4	N W	3		47	32					
10	St.	00	-----	100	St.	S E	6	S E	12	S E	16		55	36					
100	Nim.	00	-----	00	-----	S	16	W	24	W	24		50	17	3 A. M.	10 A. M.	.71		
00	-----	10	Cir.	10	St.	---	0	S W	8	S	16		32	17					
10	St.	10	Cir.	00	-----	S W	2	N	4	---	0		36	24					
60	St.	80	St.	100	St.	S	8	S W	16	S W	8		42	28	7 A. M.				
100	Nim.	100	Cu. St.	100	Cu. St.	N	12	---	0	N E	4		33	28	7 A. M.	9 A. M.	.05		
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----								
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----								
63	-----	62	-----	50	-----	-----	-----	-----	-----	-----	-----							3.98	

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				RELATIVE HUMIDITY, OR PER CENT OF SATURATION.			PRESSURE OF VAPOR, IN INCHES.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	33	48	38	39 $\frac{1}{2}$	89	63	81	.168	.212	.186	28.943	28.785	28.878	28.869
2	30	24	18	24	68	61	84	.111	.077	.082	29.078	29.255	29.401	29.245
3	15	29	26	23 $\frac{1}{2}$	100	78	75	.086	.123	.105	29.347	29.262	29.167	29.259
4	30	41	31	34	89	65	89	.148	.169	.155	29.088	29.008	29.071	29.056
5	30	46	30	35 $\frac{1}{2}$	100	54	100	.167	.169	.167	29.161	29.238	29.315	29.238
6	31	44	40	38 $\frac{1}{2}$	100	68	82	.174	.196	.203	29.368	29.251	29.153	29.257
7	47	53	46	48 $\frac{1}{2}$	92	86	84	.298	.348	.262	28.998	28.988	29.223	29.070
8	33	37	28	32 $\frac{1}{2}$	70	71	77	.150	.157	.117	-----	-----	-----	-----
9	32	42	34	36	80	66	79	.162	.177	.155	29.340	29.268	29.236	29.281
10	32	38	23	31	100	54	100	.181	.123	.123	29.317	29.378	29.364	29.353
11	32	42	37	37	100	66	90	.181	.177	.199	29.164	29.176	29.219	29.186
12	25	43	36	34 $\frac{1}{2}$	100	67	80	.123	.186	.170	29.353	29.264	29.148	29.255
13	39	50	40	43	73	65	91	.212	.234	.225	28.883	28.818	28.793	28.831
14	33	25	16	24 $\frac{1}{2}$	89	64	100	.181	.099	.090	28.868	29.103	29.206	29.059
15	15	18	17	16 $\frac{1}{2}$	100	84	100	.086	.087	.094	29.167	29.118	29.083	29.123
16	15	19	14	16	100	100	100	.086	.103	.082	28.984	28.865	28.940	28.930
17	12	19	16	15 $\frac{1}{2}$	80	85	100	.060	.087	.090	28.958	28.863	28.672	28.831
18	15	20	8	14 $\frac{1}{2}$	100	70	100	.086	.075	.062	28.694	29.040	29.201	28.978
19	6	14	1	7	100	82	100	.057	.067	.046	29.202	29.365	29.468	29.345
20	10	20	20	16 $\frac{1}{2}$	100	85	100	.068	.091	.108	29.467	29.448	29.270	29.395
21	18	22	11	17	100	100	100	.098	.118	.071	29.203	29.153	29.354	29.237
22	6	13	8	9	76	81	100	.043	.063	.062	29.272	29.564	29.581	29.472
23	14	18	26	19 $\frac{1}{2}$	100	100	100	.082	.098	.141	29.337	28.913	28.828	29.026
24	27	30	23	26 $\frac{1}{2}$	100	89	86	.147	.148	.106	28.939	29.015	29.063	29.006
25	21	30	20	23 $\frac{1}{2}$	100	89	100	.113	.148	.108	28.959	28.953	28.986	28.966
26	25	36	33	31 $\frac{1}{2}$	87	61	89	.117	.129	.168	28.835	28.814	28.833	28.827
27	20	22	14	18 $\frac{1}{2}$	100	72	82	.108	.084	.067	28.793	28.957	29.169	28.973
28	16	22	13	17	100	58	62	.090	.068	.048	29.230	29.198	29.168	29.199
29	14	36	35	28 $\frac{1}{2}$	82	61	61	.067	.129	.127	29.053	29.028	29.053	29.045
30	32	33	32	32 $\frac{1}{2}$	100	89	100	.181	.168	.181	29.068	29.022	29.130	29.073
31	26	28	24	26	100	88	87	.149	.135	.111	29.332	29.281	29.368	29.327
Sums.	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Means	-----	-----	-----	26° 39	93	75	90	.128	.137	.126	-----	-----	-----	29.124
Average	-----				86			.130			-----			

THE MONTH OF DECEMBER, 1883.

CLOUDS.						WINDS.						OZONE.		REGISTER- ING THER- MOMETER.	RAIN AND SNOW.					
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.		Day: 7 A. M. to 2 P. M.	Night: 9 P. M. to 7 A. M.	Maximum.	Minimum.	Beginning, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain or Melt'd Snow.	Depth of Snow, In.	
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.									
100	St.	100	St.	30	St.	s	8	s	w	16	w	12	---	50	27	---	---	---	---	
100	St.	40	Cu.	00	---	n	w	16	n	20	---	0	---	33	13	---	---	---	---	
50	St.	10	St.	00	---	w	3	s	8	n	w	12	---	31	15	---	---	---	---	
100	St.	60	Cir. St.	00	---	s	e	5	---	0	---	0	---	41	26	---	---	---	---	
00	---	00	---	00	---	---	0	w	8	---	0	---	---	46	26	---	---	---	---	
100	Fog.	20	Cir. St.	30	Cu. St.	s	e	8	s	12	s	e	12	---	47	31	---	---	---	
100	Nim.	90	Cu. St.	50	St.	s	8	s	16	s	w	12	---	55	33	5 A. M.	10 A. M.	.18	---	
100	St.	00	---	100	Cu. St.	w	12	w	16	s	w	---	---	38	26	---	---	---	---	
60	Cir. Cu.	00	---	60	---	w	---	s	w	16	w	12	---	42	32	---	---	---	---	
20	Cir. St.	60	---	00	---	s	w	16	n	w	8	---	0	38	22	---	---	---	---	
20	Cir. St.	10	Cir.	80	Cir. Cu.	s	w	16	w	20	n	w	6	43	25	---	---	---	---	
10	St.	10	Cir.	00	---	w	3	n	w	12	s	w	12	43	25	---	---	---	---	
10	St.	80	Cir. St.	100	St.	s	16	s	w	20	w	16	---	50	33	---	---	---	---	
100	St.	80	Cu. St.	100	St.	w	12	n	w	16	n	16	---	31	14	---	---	---	---	
100	Cu. St.	100	Nim.	100	Nim.	n	8	n	w	8	n	w	4	18	13	---	---	---	---	
100	St.	100	Nim.	50	Cir. Cu.	s	w	6	n	e	4	n	e	2	20	3	---	---	---	---
100	St.	100	St.	100	Nim.	s	w	3	s	20	s	e	12	23	12	6 P. M.	---	---	---	
100	Nim.	80	Cu. St.	00	---	w	12	s	w	16	---	0	---	22	2	---	8 A. M.	.20	3	
100	St.	30	St.	00	---	s	w	1	n	w	8	---	0	16	-2	---	---	---	---	
100	St.	60	Cir. St.	100	Nim.	---	0	s	8	s	e	1	---	21	10	---	---	---	---	
100	Nim.	100	Nim.	00	---	s	w	1	w	6	w	6	---	22	2	Snow	flurr's	.08	1	
100	St.	100	St.	50	St.	w	12	w	16	n	e	8	---	16	5	---	---	---	---	
100	Nim.	100	Nim.	100	Nim.	e	3	s	e	3	s	6	---	27	14	5 A. M.	1 P. M.	.40	2	
100	St.	100	St.	100	St.	w	8	w	12	w	1	---	---	31	19	---	---	---	---	
100	Nim.	100	Cu. St.	100	St.	s	8	s	w	12	s	w	12	30	21	---	---	---	---	
80	St.	100	St.	100	St.	s	12	s	12	---	0	---	---	36	20	---	---	---	---	
100	Nim.	00	---	50	St.	n	16	n	w	8	w	4	---	23	6	5 A. M.	11 A. M.	.20	2	
100	St.	10	Cir.	00	---	s	w	16	s	12	---	0	---	22	10	---	---	---	---	
20	St.	70	Cir. St.	100	St.	s	e	4	s	6	---	0	---	36	14	---	---	---	---	
100	Nim.	100	Nim.	100	Nim.	e	4	n	e	6	n	e	6	33	26	6 A. M.	10 P. M.	.30	---	
100	St.	100	St.	100	Cu. St.	n	4	n	8	n	e	4	---	23	8	---	---	---	---	
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1.28	---	
80	---	62	---	53	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	

ABSTRACT OF METEOROLOGICAL OBSERVATIONS AT THE STATE AGRICULTURAL COLLEGE FOR 1883.

MONTHS, 1883.	Av. Temperature.	Barometer.	Clouds.	Precipitation.	Relative Humidity.	Force, Vapor.	Temp.—Range.
January	14.39	29.129	67	1.53	95	.077	58
February.....	19.76	29.252	61	4.50	93	.106	52
March.....	24.89	29.059	48	.71	85	.113	60
April.....	43.48	29.042	54	1.90	69	.198	69
May.....	52.78	29.007	66	5.66	72	.289	49
June.....	65.87	28.998	62	11.35	81	.530	45
July.....	68.94	29.072	54	11.27	80	.569	45
August.....	64.90	29.154	34	.18	74	.452	59
September.....	56.43	29.162	53	2.34	78	.360	58
October.....	46.17	29.158	70	3.66	78	.256	55
November.....	38.08	29.128	58	3.98	80	.194	56
December	26.39	28.124	65	1.28	86	.130	57
Year	43.51	29.107	58	48.36	81	.273	108

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